I-Tech Series

Operation Manual

PRELIMINARY

I-T4000

I-T6000

I-T8000

Obtaining Other Language Versions: To obtain information in another language about the use of this product, please contact your local Crown Distributor. If you need assistance locating your local distributor, please contact Crown at 574-294-8000.

This manual does not include all of the details of design, production, or variations of the equipment. Nor does it cover every possible situation which may arise during installation, operation or maintenance.

The information provided in this manual was deemed accurate as of the publication date. However, updates to this information may have occurred. To obtain the latest version of this manual, please visit the Crown website at www.crownaudio.com.

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Some models may be exported under the name Amcron.®

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137289-2C
5/04

A Harman International Company

Important Safety Instructions

1) Read these instructions.
2) Keep these instructions.
3) Heed all warnings.
4) Follow all instructions.
5) Do not use this apparatus near water. Do not expose to dripping or splashing. Do not place objects filled with liquid on unit.
6) Clean only with a dry cloth.
7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10) Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11) Only use attachments/accessories specified by the manufacturer.

12) Use only with a cart, stand, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13) Unplug this apparatus during lightning storms or when unused for long periods of time.
14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

15) To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

TO PREVENT ELECTRIC SHOCK DO NOT REMOVE TOP OR BOTTOM COVERS. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

À PRÉVENIR LE CHOC ÉLECTRIQUE N'ENLEVEZ PAS LES COUVERCLES. IL N'Y A PAS DES PARTIES SERVICEABLE À L'INTÉRIEUR. TOUS REPARATIONS DOIT ETRE FAIRE PAR PERSONNEL QUALIFIÉ SEULMENT.

AVIS
RISQUE DE CHOC ÉLECTRIQUE
N'OUVREZ PAS

IMPORTANT

I-Tech Series amplifiers require Class 1 output wiring.

CAUTION

I-Tech amplifiers and their associated sound system may be capable of producing SPL's that cause hearing loss. The user is encouraged to keep SPL's within safe limits as specified by ANSI, NIOSH or EPA.

MAGNETIC FIELD

CAUTION! Do not locate sensitive high-gain equipment such as preamplifiers or tape decks directly above or below the unit. Because this amplifier has a high power density, it has a strong magnetic field which can induce hum into unshielded devices that are located nearby. The field is strongest on the right side and right bottom of the amplifier (facing the amplifier).

If an equipment rack is used, we recommend locating sensitive equipment at least 20 cm away from the amplifier.

WATCH FOR THESE SYMBOLS:

The lightning bolt triangle is used to alert the user to the risk of electric shock.

The exclamation point triangle is used to alert the user to important operating or maintenance instructions.

FCC COMPLIANCE NOTICE

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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Getting Started With I-Tech

Welcome! Operating your I-Tech amplifier can be as simple or advanced as you wish. Right out of the box, it works like any other amplifier with stereo loudspeaker loads.

- For bridge-mono operation, see page 5.
- If you want to control and monitor the amplifier with Crown's IQ System® software, see Section 4.5.4.
- If you want to load DSP presets or perform diagnostics using the amplifier's LCD control screen (Figure A.3), see Section 4.2.

You can refer to this Quick-Start Guide to get up and running quickly. To learn about I-Tech's many advanced features, please see the rest of this manual.

Quick-Start Guide: Stereo Wiring

Let's assume that you unpacked and installed your amplifier with the proper cooling. If not, see Section 2 in this manual. We'll also assume that you will operate the amplifier in stereo. If you want to operate your amplifier in bridge-mono, skip to page 5.

1. IMPORTANT: Turn off the amplifier. Unplug its power cord from the AC outlet. The amplifier must be grounded when plugged into AC power.

2. See Figure A.1. Connect two cables from your mixer output to the amplifier's XLR input connectors.

3. Using Class 1 wiring, connect speaker cables either to the amplifier's Speakon® connectors (as in Figure A.2) or to the 5-way binding posts (as in Figure A.1.)

4. Turn down your mixer master faders. Plug the power cord into the amplifier and then into an AC outlet. Turn on the front-panel power switch. The LCD Control Screen will light up (Figure A.3). Turn down (CCW) both Encoder knobs (Level controls) to maximum attenuation.

5. Play a program through your mixer. Set its level to peak at 0 dB or 0 VU maximum on the mixer meters. Gradually turn up (CW) the amplifier Encoder knobs (Level controls) to the desired volume (Figure A.3).

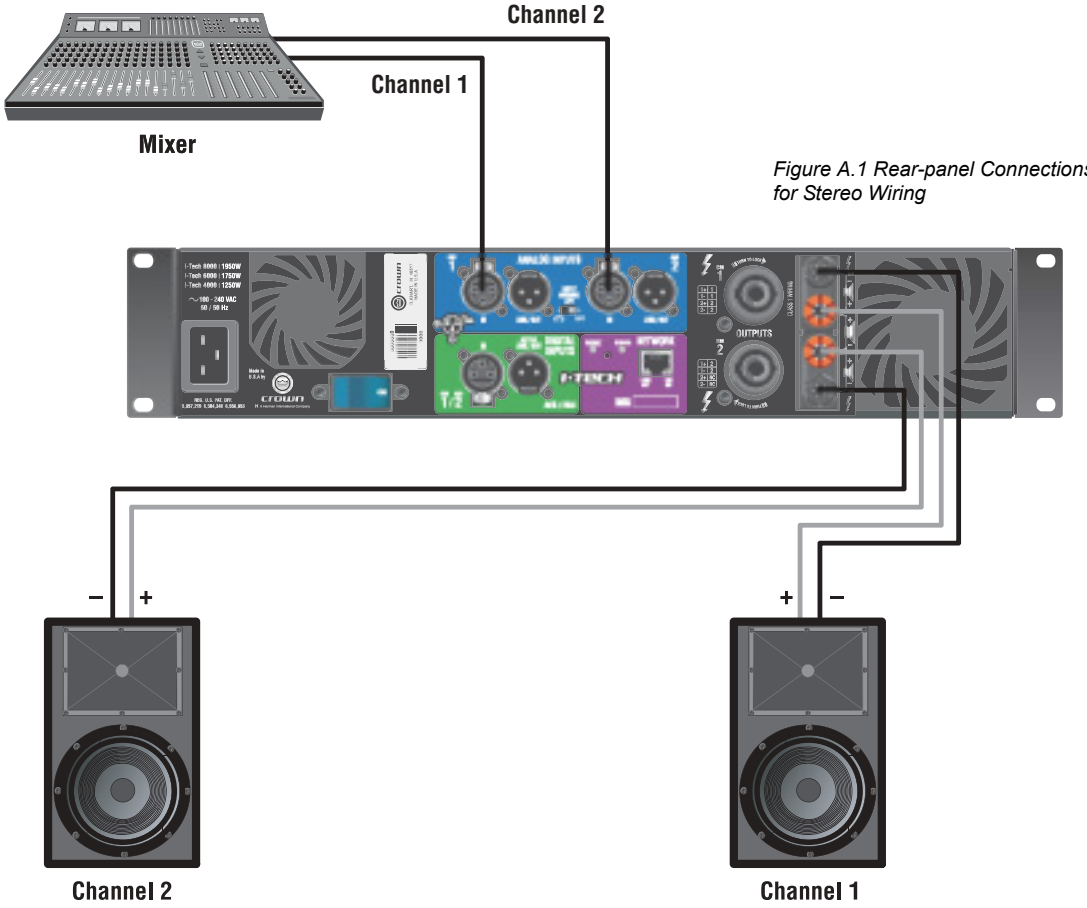
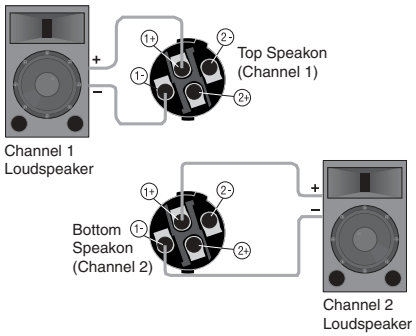


Figure A.1 Rear-panel Connections for Stereo Wiring



CAUTION – SHOCK HAZARD: Potentially lethal voltages exist at the output connectors when the amplifier is turned on and is passing a signal.

Figure A.2 Wiring Two Speakers to Two Speakon Connectors for Stereo Operation

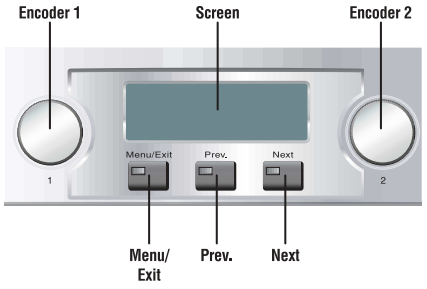


Figure A.3 The LCD Control Screen

Quick-Start Guide: Bridge-Mono Wiring

Let's assume that you unpacked and installed your amplifier with the proper cooling. If not, see Section 2 in this manual. We'll also assume that you will operate the amplifier in Bridge-Mono. Basically you will turn on the amp, enable Bridge-Mono mode with the LCD Control Screen, turn off the amp, wire it, and turn it back on.

1. Be sure that no cables are connected to the amplifier. Plug the amplifier power cord into the amplifier, then into an AC outlet.

2. Turn on the amplifier power switch on the front panel. The LCD Control Screen will light up (Figure A.4).

3. Under the LCD Control Screen, press the **Menu/Exit** button. Press the **Next** button until you see **Output Mode** on the screen.

4. Turn either Encoder knob to select BRIDGE MONO. Press the knob to confirm your choice. Press the **Menu/Exit** button. Turn down (CCW) both Level controls (Encoders) until you reach maximum attenuation.

5. IMPORTANT: Turn off the amplifier. Unplug its power cord from the AC outlet. The amplifier must be grounded when plugged into AC power.

6. See Figure A.5. Connect a cable from your mixer output to the amplifier's Channel-1 XLR input connector.

7. Using Class 1 wiring, connect the speaker cable either to the amplifier's top Speakon connector (terminals 1+ and 2+, Figure A.6) or across the red binding posts of both channels (Figure A.5). Do not use the black binding posts in bridge-mono mode.

8. Plug the amplifier's power cord into the amplifier, then into an AC outlet. Turn on the front-panel power switch.

9. Play a program through your mixer. Set its level to peak at 0 dB or 0 VU maximum on the mixer meters. Gradually turn up (CW) the amplifier's Encoder-1 knob (Level control) until you reach the desired volume (Figure A.4). Encoder-2 has no effect in Bridge-Mono mode.

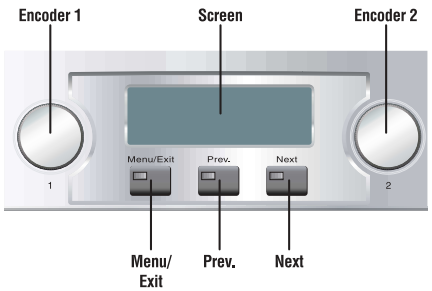


Figure A.4
The LCD Control Screen

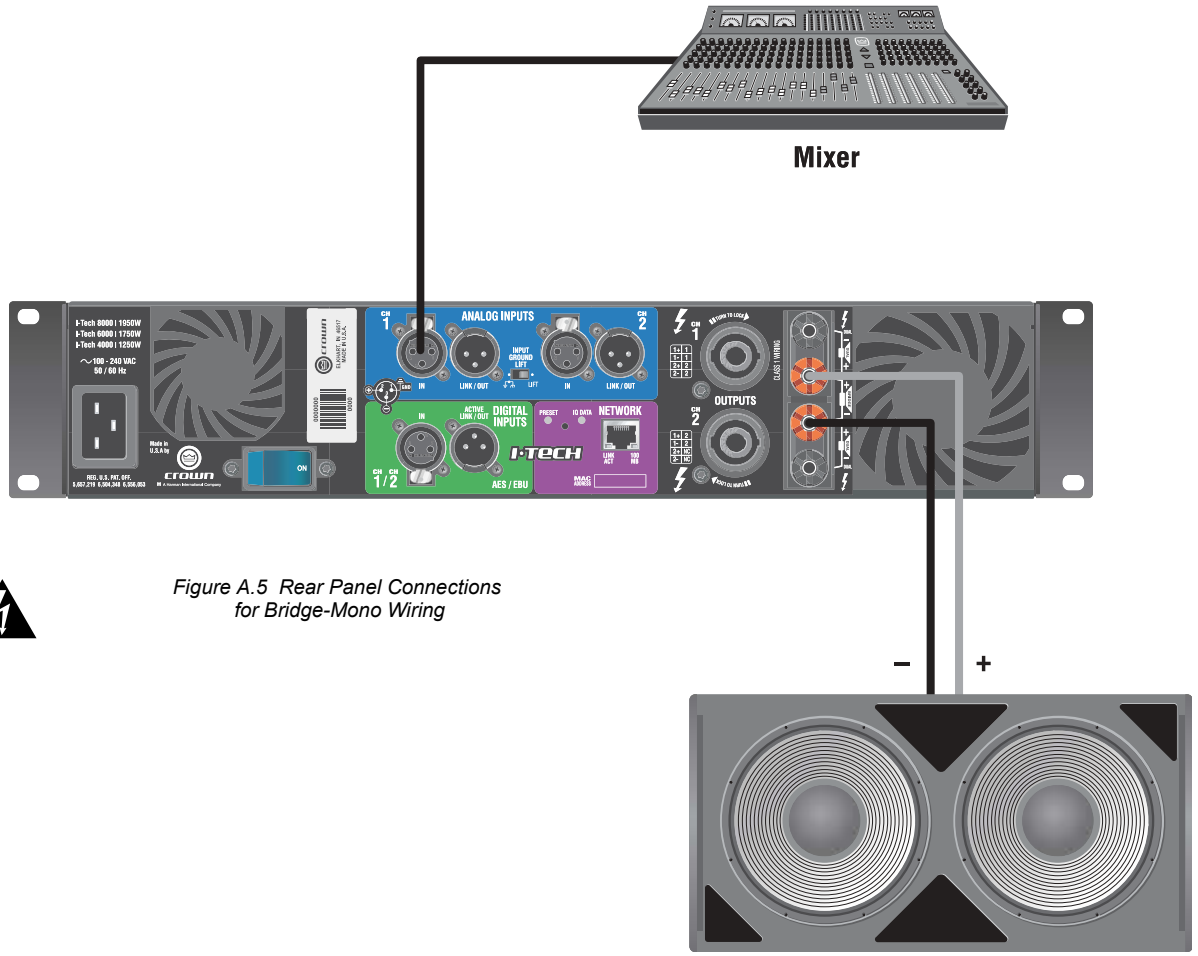


Figure A.5 Rear Panel Connections for Bridge-Mono Wiring

CAUTION – SHOCK HAZARD: Potentially lethal voltages exist at the output connectors when the amplifier is turned on and is passing a signal.

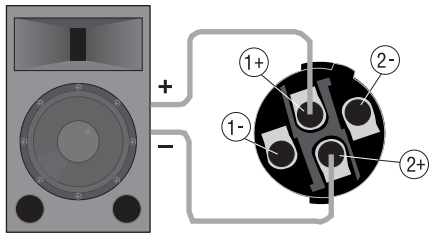


Figure A.6
Wiring a Speaker to the Top Speakon Connector for Bridge-Mono Operation

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I-T4000	20 Hz - 20 kHz Power
2-ohm Dual (per ch.)	**1,800W**
4-ohm Dual (per ch.)	**2,000W**
8-ohm Dual (per ch.)	**1,250W**
4-ohm Bridge	**3,600W**
8-ohm Bridge	**4,000W**

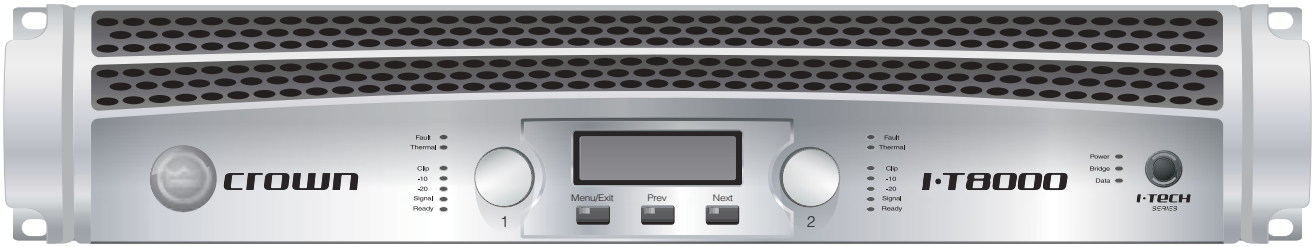
20 Hz - 20 kHz Power refers to guaranteed minimum power in watts with 0.35% THD.

I-T6000	20 Hz - 20 kHz Power
2-ohm Dual (per ch.)	**2,500W**
4-ohm Dual (per ch.)	**3,000W**
8-ohm Dual (per ch.)	**1,500W**
4-ohm Bridge	**5,000W**
8-ohm Bridge	**6,000W**

20 Hz - 20 kHz Power refers to guaranteed minimum power in watts with 0.35% THD.

I-T8000	20 Hz - 20 kHz Power
2-ohm Dual (per ch.)	**3,500W**
4-ohm Dual (per ch.)	**4,000W**
8-ohm Dual (per ch.)	**2,100W**
4-ohm Bridge	**7,000W**
8-ohm Bridge	**8,000W**

20 Hz - 20 kHz Power refers to guaranteed minimum power in watts with 0.35% THD.



1 Welcome

The Crown® I-Tech Series offers amazing power, light weight and ease of use for touring sound applications. Unlike other amplifiers, it includes onboard DSP, an LCD control screen, and a built-in network connection.

Modern power amplifiers are sophisticated pieces of engineering capable of producing extremely high power levels. They must be treated with respect and correctly installed if they are to provide the many years of reliable service for which they were designed.

In addition, I-Tech Series amplifiers include a number of features which require some explanation before they can be used to their maximum advantage.

Please take the time to study this manual so that you can obtain the best possible service from your amplifier.

1.1 Features

• Global Power Supply with PFC (Power Factor Correction) works anywhere in the world.

• High power density, up to 8000 watts in a 2U chassis.

• Highest output voltage in the industry (200V peak) provides clean transient peaks.

• 3rd-generation patented Class I (BCA®) circuitry couples power efficiently to the load and provides low AC current drain.

• Onboard DSP with 24-bit, 96 kHz Cirrus Logic A/D and D/A converters.

• Pushbutton presets simplify setup. Custom presets for various loudspeakers can be downloaded.

• AES/EBU digital audio input. Ethernet connector accepts RJ-45 connector for TCP/IQ networking. Analog and digital thru connectors. CobraNet™ input available in optional CN models, coming soon.

• LCD Control Screen is used to adjust the amplifier's attenuation and muting, configure the amp, set up and view error monitoring, and recall DSP presets to reconfigure the amp for various applications.

• Comprehensive array of indicators provide accurate diagnostics: Power, Data, Bridge, along with Ready, Signal, Clip, Thermal and Fault for each channel.

• AC mains indicator in power switch glows green when AC power is present.

• Light weight due to aluminum chassis, special internal construction and switching power supply.

• Thermal management controller and two discrete thermal zones with variable-speed fans, forced-air cooling.

• The rear rack ears have a built-in EZ-Rack Pin for easier installation.

• Advanced protection circuitry guards against: shorted outputs, DC, mismatched loads, general overheating, under/over voltage, high-frequency overloads and internal faults.

• Three-Year, No-Fault, Fully Transferable Warranty completely protects your investment and guarantees its specifications.

1.2 How to Use This Manual

This manual provides you with the necessary information to safely and correctly setup and operate your amplifier. It does not cover every aspect of installation, setup or operation that might occur under every condition. For additional information, please consult Crown's *Amplifier Application Guide* (available online at www.crownaudio.com), Crown Technical Support, your system installer or retailer.

We strongly recommend you read all instructions, warnings and cautions contained in this manual. Also, for your protection, please send in your warranty registration card today. And save your bill of sale — it's your official proof of purchase.

2 Setup

2.1 Unpack and Install Your Amplifier

Please unpack and inspect your amplifier for any damage that may have occurred during transit. If damage is found, notify the transportation company immediately. Only you can initiate a claim for shipping damage. Crown will be happy to help as needed. Save the shipping carton as evidence of damage for the shipper's inspection.

We also recommend that you save all packing materials so you will have them if you ever need to transport the unit. **Never ship the unit without the factory pack.**

YOU WILL NEED (not supplied):

- Input wiring cables
- Output wiring cables

Rack for mounting amplifier (or a stable surface for stacking)

WARNING: Before you start to set up your amplifier, make sure you read and observe the Important Safety Instructions found at the beginning of this manual.

CAUTION: Before you begin, make sure your amplifier is disconnected from the power source, with the power switch in the "off" position and all level controls turned completely down (counterclockwise).

Use a standard 19-inch (48.3 cm) equipment rack (EIA RS-310B). See Figure 2.1 for amplifier dimensions.

You may also stack amps without using a cabinet.

NOTE: When transporting, amplifiers should be supported at both front and back.

MAGNETIC FIELD

CAUTION! Do not locate sensitive high-gain equipment such as preamplifiers or tape decks directly above or below the unit. Because this amplifier has a high power density, it has a strong magnetic field which can induce hum into unshielded devices that are located nearby. The field is strongest on the right side and right bottom of the amplifier (facing the amplifier).

If an equipment rack is used, we recommend locating sensitive equipment at least 20 cm away from the amplifier.

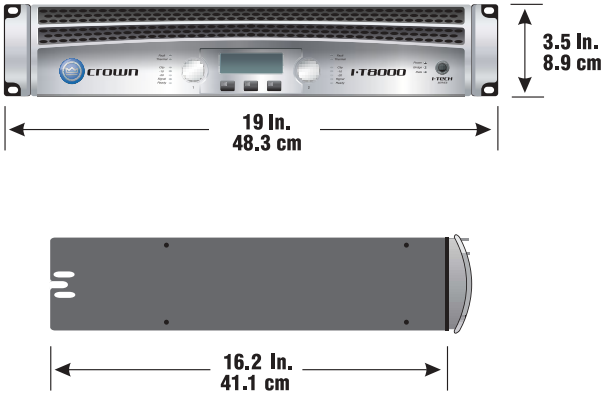


Figure 2.1 Dimensions

When using an equipment rack, mount units directly on top of each other. Close any open spaces in rack with blank panels. DO NOT block front, rear or side air vents. The side walls of the rack should be a minimum of two inches (5.1 cm) away from the amplifier sides, and the back of the rack should be a minimum of four inches (10.2 cm) from the amplifier back panel.

Figure 2.2 illustrates standard amplifier airflow.

Figure 2.2 Airflow

2 Setup

2.2 Connecting to AC Mains

WARNING: The third (ground) prong of the supplied AC power cord connector is a required safety feature. Do not attempt to disable this ground connection by using an adapter or other methods.

Amplifiers don't create energy. The AC mains voltage and current must be sufficient to deliver the power you expect. You must operate your amplifier from an AC mains power source with not more than a 10% variation above or a 15% variation below the amplifier's specified line voltage range and within the specified frequency requirements (indicated on the amplifier's back panel label). If you are unsure of the output voltage of your AC mains, please consult your electrician.

2.3 Wire Inputs and Outputs

2.3.1 Wiring basics

• Always use shielded wire for input wiring. The higher the density of the shield (the outer conductor) the better. Spiral wrapped shield is not recommended.
• When using unbalanced lines keep the cables as short as possible. Avoid lengths greater than 10 feet (3 meters).
• Do not run the audio input cables together with the high-level wiring such as loudspeaker wires or AC cords. (This lessens the chance of hum and noise being induced into the input cables.)
• Turn the entire sound system off before changing any connections. Crown is not liable for damage incurred when any transducer or component is overdriven.

DO NOT USE THE CHANNEL 2 INPUT if the amplifier is used in Bridge-Mono mode.

For additional information on audio input wiring please refer to the Crown *Amplifier Application Guide* available online at www.crownaudio.com. It contains helpful information on preventing unwanted subsonic frequencies, radio frequency interference, ground loops, and feedback oscillation.

2 Setup

2.3.2 Choose Input Wire and Connectors

Crown recommends using pre-built or professionally wired, balanced line (two-conductor plus shield), 22-24 gauge cables and connectors. Use 3-pin male XLR connectors.

Unbalanced line may also be used but may result in noise over long cable runs.

Figure 2.1 shows connector pin assignments for balanced analog wiring or AES/EBU digital wiring. Figure 2.2 shows connector pin assignments for unbalanced analog wiring.

I-Tech models with a CN suffix accept CobraNet network signals. With CobraNet, you can send digital audio and amplifier IQ®-control signals on the same Category 5 cable. This single cable plugs in to the Network connector on the rear panel.

NOTE: Custom wiring should only be performed by qualified personnel.

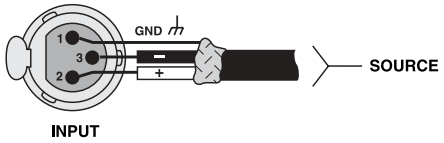


Figure 2.1
Balanced Analog Input Connector Wiring or AES/EBU Digital Connector Wiring

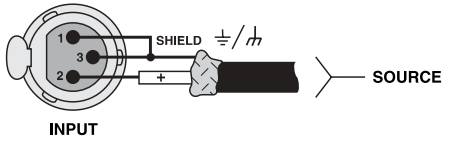


Figure 2.2 Unbalanced Analog Input Connector Wiring

2.3.3 Choose Output Wire and Connectors

Crown recommends using pre-built or professionally wired, high-quality, two- or four-conductor, heavy gauge speaker wire and connectors. Use Class 1 output wiring. You may use a 4-pole Speakon connector (Figure 2.3) or banana plugs, spade lugs, or bare wire for your output connectors (Figure 2.4). To prevent the possibility of short-circuits, wrap or otherwise insulate exposed loudspeaker cable connectors.

CAUTION – SHOCK HAZARD: Potentially lethal voltages exist at the output connectors when the amplifier is turned on and is passing a signal.

Using the guidelines below, select the appropriate size of wire based on the distance from amplifier to speaker.

Distance	Wire Size
up to 25 ft.	16 AWG
26-40 ft.	14 AWG
41-60 ft.	12 AWG
61-100 ft.	10 AWG
101-150 ft.	8 AWG
151-250 ft.	6 AWG

CAUTION: Never use shielded cable for output wiring.

Figure 2.3
Left: Speakon Output Connector on Back Panel
Right: Speakon Cable Connector

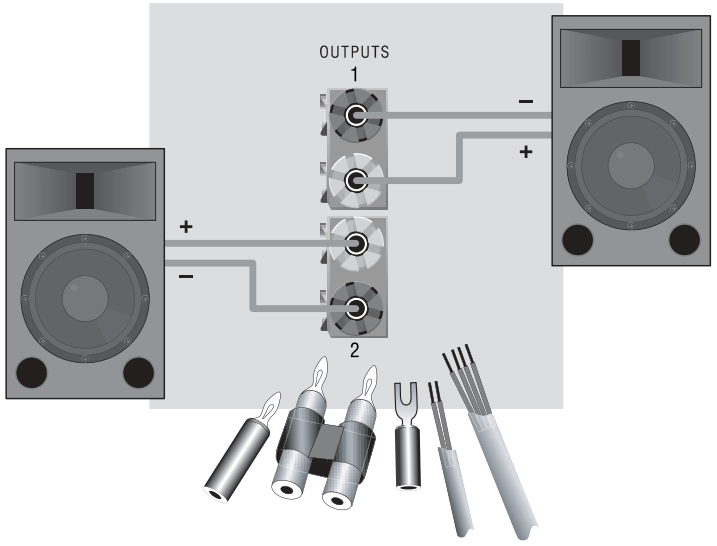


Figure 2.4
5-Way Binding Post Connections

2 Setup

2.3.4 Stereo Mode Wiring

Typical input and output wiring is shown in Figure 2.5.

IMPORTANT: Turn off the amplifier and unplug its power cord.

INPUTS: Choose one of these options:

- Connect analog input wiring for both channels.
- Connect an AES/EBU digital signal to the AES/EBU connector.
- Connect a CobraNet network cable with a digital signal to the Network connector (CN models only).

OUTPUTS: Maintain proper polarity (+/–) on output connectors. Use Class 1 output wiring.

Figure 2.5 shows how to wire stereo speakers to the 5-way binding posts. Connect Channel 1 loudspeaker's positive (+) lead to Channel 1 positive (red) terminal of amp; repeat for negative (–). Repeat Channel 2 wiring as for Channel 1.

To wire stereo speakers to the Speakon connectors, use one of these methods:

Method 1 (Table 1 and Figure 2.6): Wire one Speakon cable connector to two speakers. Insert the Speakon cable connector into the amplifier's top Speakon connector.

Method 2 (Table 2 and Figure 2.7): Plug the Channel 1 speaker into the Channel 1 (top) Speakon connector, and plug the Channel 2 speaker into the Channel 2 (bottom) Speakon connector.

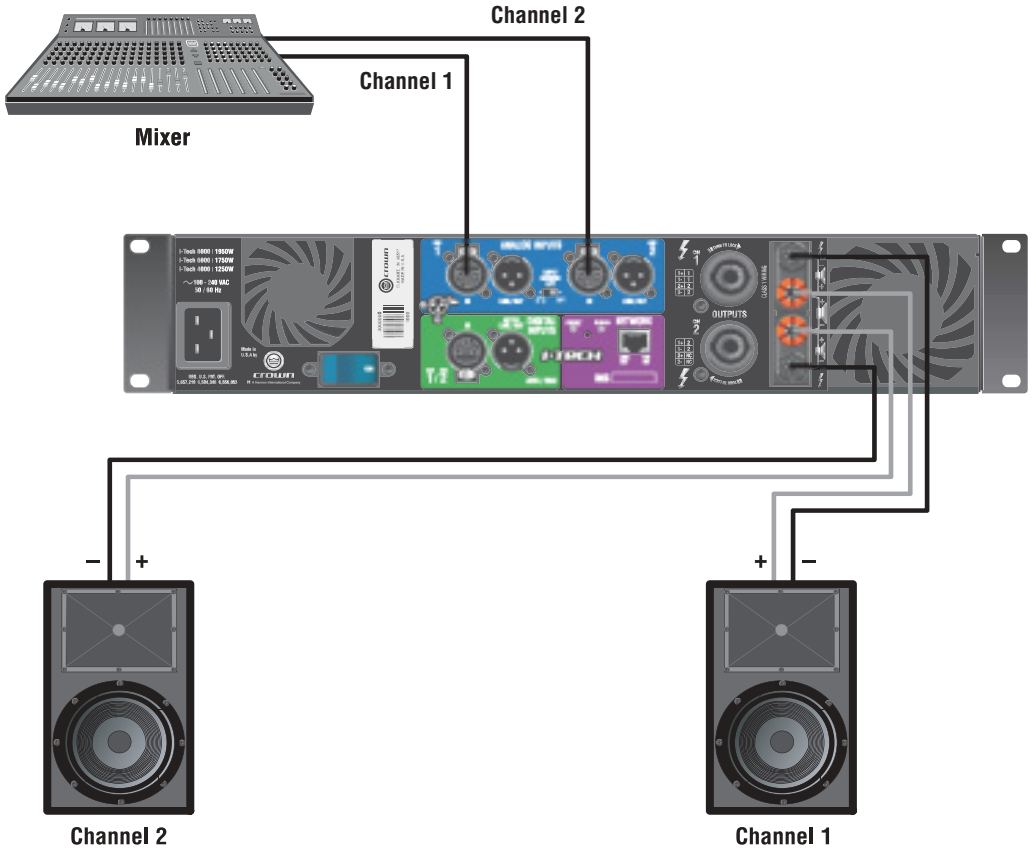


Figure 2.5 System Wiring, Stereo Mode

Table 1

Stereo Wiring Method 1: Use Top Speakon Only

PIN	1+	1–	2+	2–
CH	1+	1–	2+	2–

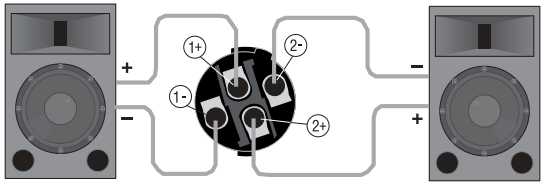


Figure 2.6 Wiring Two Stereo Speakers to the Top Speakon Connector

Table 2

Stereo Wiring Method 2: Use Both Speakons

Top Speakon

PIN	1+	1–
CH	1+	1–

Bottom Speakon

PIN	1+	1–
CH	2+	2–

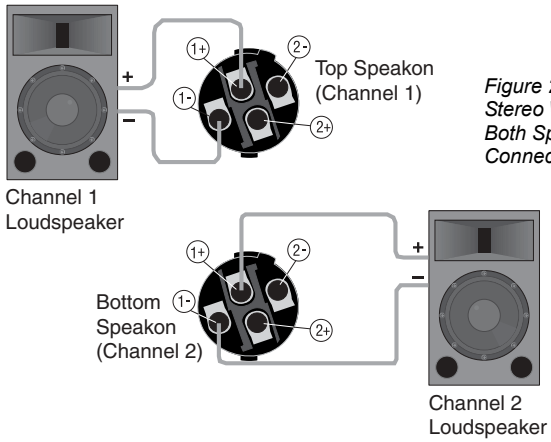


Figure 2.7 Stereo Wiring Using Both Speakon Connectors

2 Setup

2.3.5 Bridge-Mono Mode

Overview: Turn on the amp, enable Bridge-Mono mode using the LCD Control Screen, turn off the amp, wire it, and turn it back on.

1. Be sure that no cables are connected to the amplifier. Turn on the front-panel power switch. The LCD Control Screen will light up (Figure 2.8).

2. Under the LCD Control Screen, press the **Menu/Exit** button. Press the **Next** button until you see OUTPUT MODE on the screen.

3. Turn an Encoder knob to select BRIDGE MONO. Press the knob to confirm your choice. Press **Menu/Exit**. Turn down both level controls (Encoders) until you reach maximum attenuation.

4. IMPORTANT: Turn off the amplifier and unplug its power cord.

INPUTS: There are three ways to connect an input signal to the amplifier (Figure 2.9):

- Connect an analog signal source to the Channel-1 amplifier input.
- Connect an AES/EBU digital signal source to the Digital Input IN connector.
- Connect a CobraNet network signal with digital audio to the Network connector (CN models only).

NOTE: Crown provides a reference of wiring pin assignments for commonly used connector types in the Crown *Amplifier Application Guide* available at www.crownaudio.com.

OUTPUTS: Use Class 1 output wiring. There are two ways to wire the amplifier output connectors for Bridge-Mono mode:

1) Wire the speaker across the red binding post of each channel (Figure 2.9). Do not use the black binding posts when operating in Bridge-Mono mode.

2) Wire the speaker only to the top Speakon connector as shown in Table 3 and Figure 2.10.

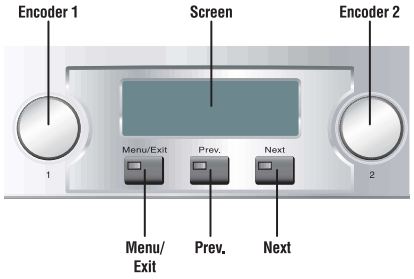


Figure 2.8
The LCD Control Screen

NOTE: In Bridge-Mono mode, the Channel 1 Level control sets the level; the Channel 2 Level control is defeated.

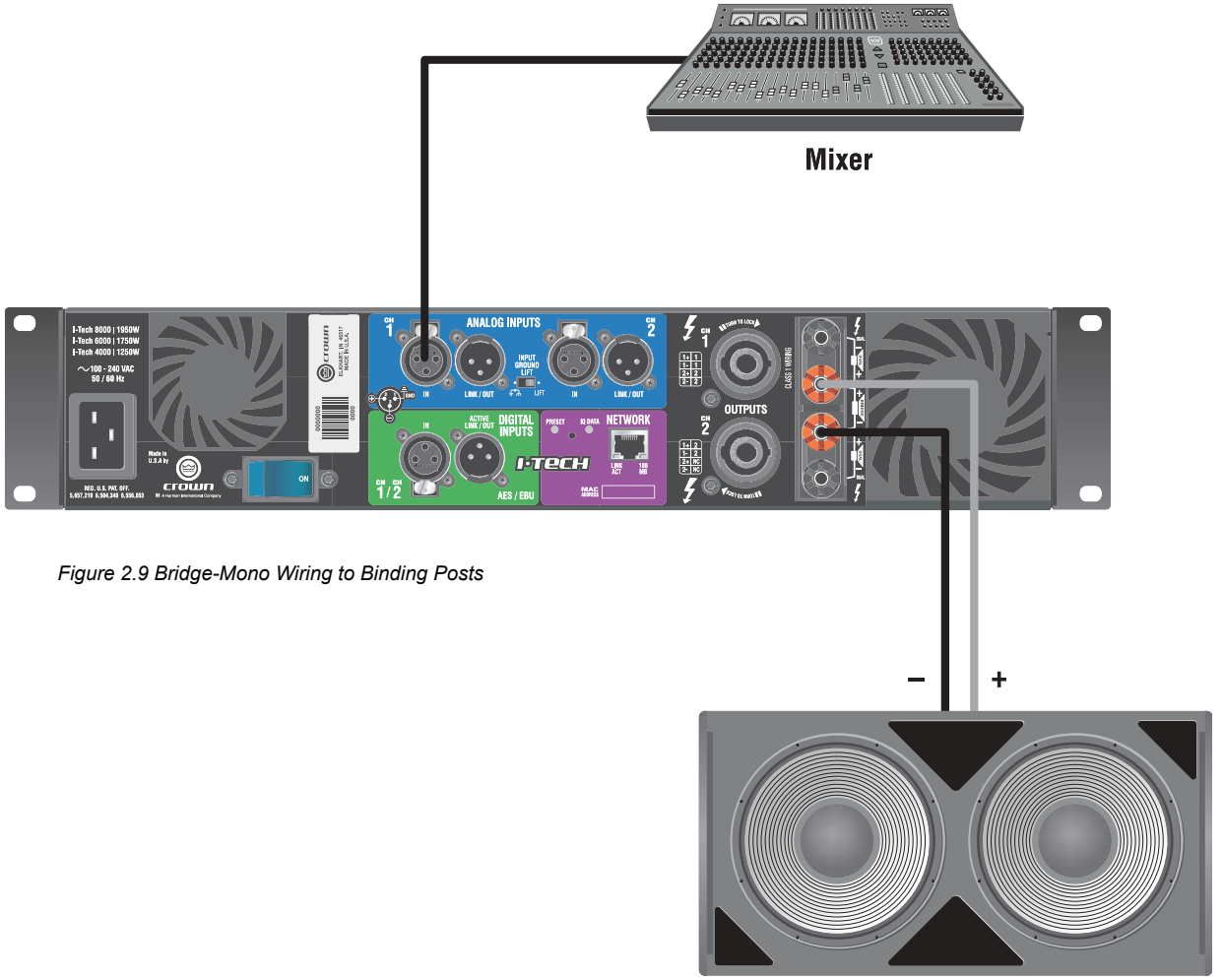


Figure 2.9 Bridge-Mono Wiring to Binding Posts

Table 3

Top Speakon Wiring for Bridge-Mono

PIN	1+	2+
SPKR	+	–

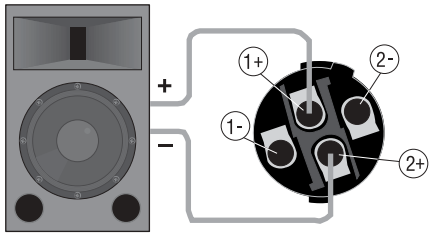


Figure 2.10
Wiring a Speaker in Bridge-Mono Mode to the Top Speakon Connector

3 Operation

3.1 Protecting Your Speakers

It's wise to avoid clipping the amplifier signal. Not only does clipping sound bad, it can damage high-frequency drivers. To prevent clipping, use IQwic™ software to enable the peak voltage limiter and average power limiter in your amplifier's built-in DSP. That way, no matter how strong a signal your mixer produces, the amplifier will not clip. Set the limiter threshold so that mixer signals above 0 dB or 0 VU on the mixer meters do not quite drive the amplifier into clipping.

Also, avoid sending strong subsonic signals to the amplifier. High-level, low-frequency signals from breath pops or dropped microphones can blow out drivers. To prevent subsonic signals, use one of these methods:

• Insert a highpass filter between mixer output and amplifier input (or between mixer and limiter).

• Use the I-Tech's onboard DSP to set up a highpass filters. This can be done using the Wizard in the IQwic software.

• Switch in highpass filters at your mixer. Set the filter to as high a frequency as possible that does not affect your program. For example, try 35 Hz for music and 75 Hz for speech. On each mixer input channel, set the filter frequency just below the lowest fundamental frequency of that channel's instrument.

3.2 Startup Procedure

Use the following procedure when first turning on your amplifier:

1. Turn down the level of your audio source.
2. Turn on the Power switch. The Power indicator should glow and the LCD Control Screen should light up.
3. Turn down the amplifier Encoder knobs (Level controls).
4. Turn up the level of your audio source to an optimum level.
5. Turn up the amplifier Encoder knobs (Level controls) until the desired loudness or power level is achieved.
6. Turn down the level of your audio source to its normal range.

If you ever need to make any wiring or installation changes, don't forget to disconnect the power cord.

For help with determining your system's optimum gain structure (signal levels) please refer to the Crown *Amplifier Application Guide*, available online at www.crownaudio.com.

3.3 Precautions

Your amplifier is protected from internal and external faults, but you should still take the following precautions for optimum performance and safety:

1. Before use, your amplifier first must be configured for proper operation, including input and output wiring hookup. Improper wiring can result in serious operating difficulties. For information on wiring and configuration, please consult the Setup section of this manual or, for advanced setup techniques, consult Crown's *Amplifier Application Guide* available online at www.crownaudio.com.
2. Use care when making connections, selecting signal sources and controlling the output level. The load you save may be your own!
3. Do not short the ground lead of an output cable to the input signal ground. This may form a ground loop and cause oscillations.

4. **WARNING: Never connect the output to a power supply, battery or power main. Electrical shock may result.**
5. Tampering with the circuitry, or making unauthorized circuit changes may be hazardous and invalidates all agency listings.
6. Do not operate the amplifier with the red Clip LEDs constantly flashing.
7. Do not overdrive the mixer, which will cause clipped signal to be sent to the amplifier. Such signals will be reproduced with extreme accuracy, and loudspeaker damage may result.
8. Do not operate the amplifier with less than the rated load impedance. Due to the amplifier's output protection, such a configuration may result in premature clipping and speaker damage.

9. **CAUTION – SHOCK HAZARD: Potentially lethal voltages exist at the output connectors when the amplifier is turned on and is passing a signal.**

Remember: Crown is not liable for damage that results from overdriving other system components.

3 Operation

3.4 Front Panel Controls and Indicators

A. Cooling Vents
Front-to-rear forced airflow through foam dust filter.

LCD Control Screen and Controls

B. LCD Control Screen
Integrated LCD with white backlight, controls amplifier setup and operation.

The LCD Control Screen and its controls let the user adjust the amplifier's attenuation and muting, configure the amp, set up and view error monitoring (such as temperature and load supervision), and recall DSP presets. The presets allow the user to quickly reconfigure the amp for various applications.

C. Level Controls (Encoders)
Speed-sensitive, 0.5 dB steps, range 0 to –90 dB.

These two knobs affect the Channel-1 and Channel-2 output levels. They also select Menu items and adjust parameter values that are displayed on the LCD control screen.

D. Menu/Exit Button
"Menu" enters the main menu. "Exit" leaves the menu.

E. Prev Button
Selects the previous item in the menu.

F. Next Button
Selects the next item in the menu.

Thermal and Fault Indicators

G. Thermal Indicator
Red LED, one per channel, illuminates when the channel has shut down, or is very near shutting down, due to thermal stress or overload.

H. Fault Indicator
Red LED, one per channel, flashes when the amplifier output channel has stopped operating. Usually this means that the amplifier must be serviced.

I. Clip Indicator
Red LED, one per channel, illuminates when the channel's output signal reaches the onset of audible clipping. The Clip Indicator also will illuminate during Thermal Level Control (TLC) limiting.

Signal Indicators

Three green LEDS per channel indicate the amplifier's input and output signal levels. From top to bottom the LEDs are:

J. –10 dB: amplifier output is 10 dB below clipping.

K. –20 dB: amplifier output is 20 dB below clipping.

L. Signal: input signal is above –40 dBu.

M. Ready Indicator
Green LED, one per channel, illuminates when the channel is initialized and ready to produce audio output. Indicator is off when the channel is set to standby mode via the IQ system.

N. Power Indicator
Blue LED indicates amplifier has been turned on and AC power is available. The LED will flash when the AC line voltage is 15% above or below the nominal rated range.

O. Bridge Mode Indicator
Yellow LED illuminates when the amplifier is set to Bridge-Mono mode.

P. Data Indicator
Yellow LED indicates IQ Network data activity. Data indicator flashes only when the amplifier is polled for data, or is polled to see whether it is online.

Q. Power Switch
Push-on/push-off switch glows green when AC power is present at the power cord and the amplifier circuit breaker is in the "on" position.

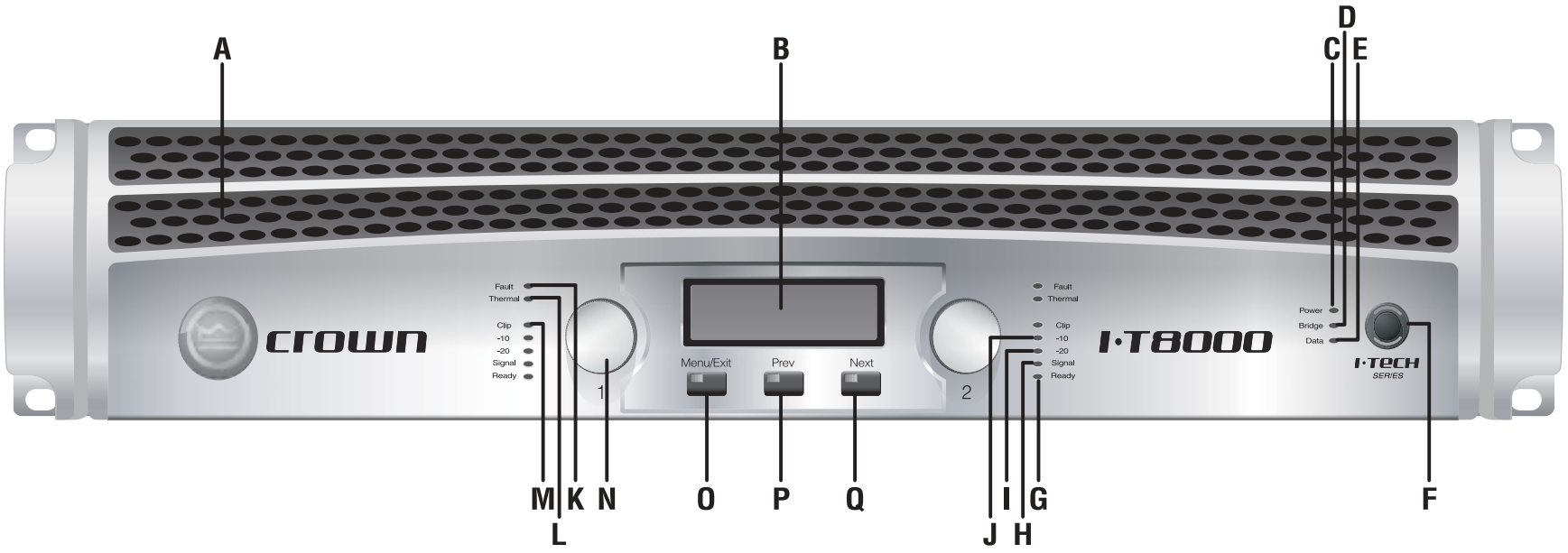


Figure 3.1 Front Panel Controls and Indicators

3 Operation

3.5 Back Panel Controls, Indicators and Connectors

A. Fans
Provide front-to-back forced airflow for cooling.

ANALOG INPUTS SECTION

B. Balanced Analog XLR Inputs
A 3-pin female XLR connector for each channel.

C. Balanced Analog XLR Loop-Through Outputs
Two 3-pin male XLR output connectors are provided (one per channel). The signal at these connectors is paralled with the input signal for feeding the input signal to other amplifiers.

D. Input Ground-lift Switch
Isolates input ground from AC ground. Can be used to prevent ground loops.

OUTPUTS SECTION

E. 4-Pole Speakon Output Connectors
Two high-current, 50A Neutrik® Speakon NL4MLP (mates with NL4FC), one per channel. Class 1 output wiring required.

These two connectors accept 2-pole or 4-pole Speakon connectors. See Figures 2.5 through 2.10 and Tables 1, 2 and 3 for connector wiring. The top Speakon connector is wired for both channels so it can be used for bridge-mono wiring or for stereo wiring of two speakers to a single Speakon connector.

M. 5-Way Binding Post Output Jacks
One pair per channel of high-current, 60A color-coded 5-way binding posts. Accepts banana plugs, spade lugs or bare wire.

F. Power Cord Connector
Standard 20 amp IEC inlet. Voltage range is indicated above IEC inlet.

G. Reset Switch/Circuit Breaker
If the current draw of the amplifier exceeds safe limits, this breaker automatically disconnects the power supply from the AC mains. The switch resets the circuit breaker.

DIGITAL INPUTS SECTION

H. AES/EBU Digital Input
This 3-pin female XLR connector accepts a digital signal in the AES/EBU format.

I. AES/EBU Digital Loop-through Output
Male XLR active/re-clocked AES/EBU digital loop-through. The signal at this connector duplicates the digital input signal for feeding the input signal to other amplifiers.

NETWORKING SECTION

J. Preset Indicator
Yellow LED flashes to signal the number of the current preset if active.

K. IQ Data Indicator
Yellow LED indicates IQ Network data activity. Data indicator flashes only when the amplifier is polled for data, or is polled to see whether it is online.

L. Network Connector
This Ethernet connector accepts an RJ-45 connector for TCP/IQ networking. Built into the connector is a yellow LINK ACT indicator that shows network activity, and a green 100Mb indicator that shows a 100Mb network connection.

In optional CN models, coming soon, the Ethernet connector accepts a CobraNet network signal, which provides both digital audio and IQ control/monitoring on a single cable.

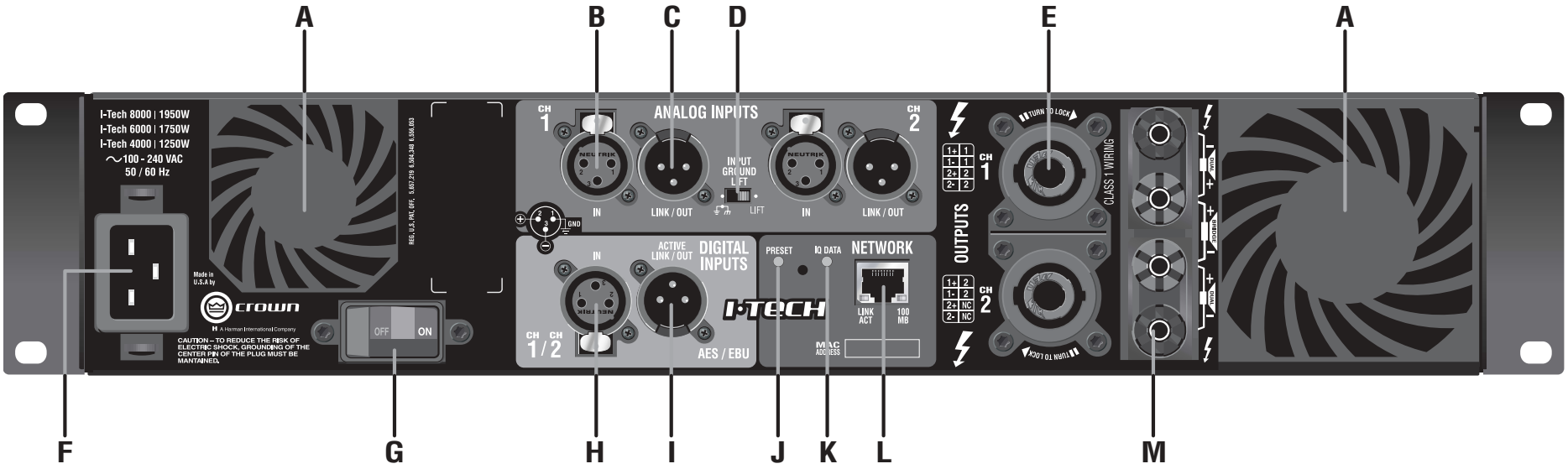


Figure 3.2 Back Panel Controls and Connectors

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4 Advanced Operation

4.2 Navigating the LCD Control Screen

4.2.1 Introduction

The LCD Control Screen and its controls let you configure the amplifier and access many IQ features that before were available only through a remote computer. Also, you can recall DSP presets for certain loudspeaker models. (Some DSP parameters cannot be adjusted with the LCD Control Screen. That is done in IQwic with assistance from the Help files.)

Figure 4.1 shows the parts of the LCD Control Screen. Its functions are described below. NOTE: These functions can also be controlled in IQwic with assistance from the Help files.

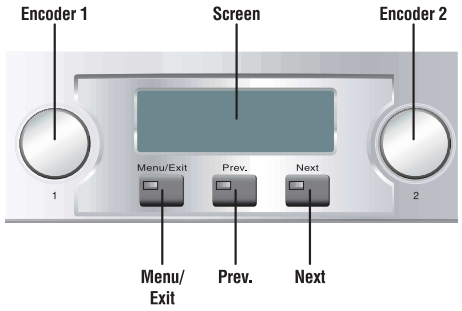

Figure 4.1 Parts of the LCD Control Screen

Attenuation (output level)

On power-up, the LCD Control Screen displays the attenuation in dB and on a bar meter. To change the attenuation in either channel, turn the **Encoder**. Attenuation changes 0.5 dB per detent when you turn the Encoder slowly, and more when you turn the Encoder quickly.

Mute/Unmute

- To mute either channel: Press and hold an Encoder knob for 2 seconds. The display will alternate between MUTE and the attenuation level. While the amplifier is muted, you can adjust attentuation for each channel by turning an Encoder knob.
- To unmute either channel: Press and hold an Encoder knob again for 2 seconds.

Front Panel Lockout

The amplifier's administrator can control access to menu mode and the amplifier's attenuators. This lockout can be done either by the front panel buttons or by IQ software.

To lock or unlock the menu with the front-panel buttons, press **Next** and **Prev** simultaneously. Those buttons toggle the LOCK/UNLOCK status. To lock or unlock the menu with IQ software, see the IQ software help files.

If the lockout is done from the IQ software, the user can disable the lockout only in the IQ software, not by pressing the front-panel buttons.

If the menu is locked and you press any button or turn an Encoder, the word "LOCKED" is displayed.

4.2.2 Basic Menu

Getting around in the Menu is intuitive. Here are the basic operations:

- Press **Menu/Exit** to enter the main menu.
- Press **Next** to go to the next item in the menu.
- Press **Prev** to go to the previous item in the menu.
- Turn either **Encoder** knob to change the value of the displayed parameter.
- Press **Menu/Exit** to leave the menu.

Some menu items require confirmation: after you request a change, the display might say "Press Knob." To confirm a change, press an **Encoder** knob. If you don't want the change to occur during a confirmation, press **Next**, **Prev**, or **Menu/Exit**.

Basic Menu Items

Contrast: Press **Menu/Exit** to enter the Basic Menu. The first item on the menu you see is the Contrast screen. Turn an Encoder knob to change the contrast of the LCD screen. You can return to the Attenuation screen by pressing **Menu/Exit,** or go to other menu items by pressing **Next** or **Prev**.

CH1 Sensitivity: Sets the input sensitivity of Channel 1. Turn an Encoder knob to change the input sensitivity.

Note: If you do not see the sensitivity you need, try changing the Maximum Analog Input level in the Advanced Features Menu (described later). This makes different sensitivities available.

CH2 Sensitivity: Sets the input sensitivity of Channel 2. Turn an Encoder knob to change the input sensitivity.

Note: If you do not see the sensitivity you need, try changing the Maximum Analog Input level in the Advanced Features Menu (described later). This makes different sensitivities available.

Speaker Preset: A preset is a group of DSP and amplifier settings for a particular speaker. Turn an Encoder to view presets 1 through 10. Press the Encoder to recall the preset. For more information on presets, see Section 4.3.

In the example shown below,

- Preset 7 was last recalled (it's not flashing).
- Preset 7 has been modified (indicated by "changed").
- The Preset name is "Vertec VT4881 MF."
- The Channel-1 label is "MF – 1&2."
- The Channel-2 label is "MF – 3&4."

Output Mode: Turn an Encoder knob to select DUAL or BRIDGE (Bridge Mono). You will be prompted to confirm your choice. Press an Encoder knob to confirm your choice. DUAL is the default. The Bridge indicator on the front panel will illuminate when the amplifier is bridged.

Input Y: Turn an Encoder knob to select STEREO or Input Y. You will be prompted to confirm your choice. Press an Encoder knob to confirm your choice. When Input Y is enabled, Channel 1's input signal feeds both channels. STEREO is the default.

4.2.3 Advanced Features Menu

Press an Encoder knob to enter the Advanced Features Menu, described next.

Attenuator Limits: You can set the maximum attenuation from 0 dB to –100 dB. No confirmation is needed. This feature allows you to set an upper limit on the attenuators. Once set, the attenuation cannot be adjusted above this level.

NOTE: The attenuator setting must be below the attenuator limit that you are trying to set. For example, if the attenuator is set at –3 dB, you cannot set the attenuator limit below –3 dB unless you also decrease the attenuator level.

Attenuator Link: Allows either attenuator (Encoder) to control both channels. Push an Encoder knob to select Independent or Linked. Once the attenuators are linked, any difference in channel attenuation will be maintained.

Clip Limiter: Limits the output signal to prevent clipping. Press an Encoder knob to select ON or OFF. ON is the default.

Peak Voltage Limiter: Limits the output voltage to an amount that you set, either OFF or 0 to 200 volts. Press the Encoder to turn on the Limiter. Once it's on, turn the Encoder to set the voltage. When done, press **Menu/Exit**, **Next** or **Prev**.

Average Power Limiter: Limits the output power to an amount that you set, from 0 to 8000 watts. Press the Encoder to turn on the Limiter. Once it's on, turn the Encoder to set the power. When done, press **Menu/Exit**, **Next** or **Prev**. Additional controls, such as attack and release, are available through IQwic.

Pink Noise Generator: Adjust the noise level from 0 dB to -100 dB (off) in 0.5 dB steps by turning Encoder 1 or 2. The level can be adjusted only when this menu option is visible. Moving to another menu turns off the noise generator. The default setting is –100 dB.

4 Advanced Operation

AES/EBU Input Trim: Sets the gain of the AES/EBU digital input signal. Turn an Encoder to change the gain.

Input Source: For each channel, press the Encoder to select analog, digital, or automatic backup source. Options are:
Digital (DIG)
Analog (ANLG)
Digital with analog backup (D–A)
Analog with digital override (A–D)

Maximum Analog Input: Press an Encoder to select +21 dBu or +15 dBu. When set to +21 dBu, the maximum input level to the amplifier is +21 dBu. When set to +15 dBu, the maximum input level to the amplifier is +15 dBu. Note: Changing this value changes the range of sensitivities available to the amplifier.

Amplifier Label Edit: This lets you label the amplifier according to its function. Turn the right Encoder one click to select a letter position. Turn the left Encoder to select a letter, character or space. When done, press **Menu/Exit**, **Next** or **Prev**.

CH1 Label Edit: This lets you label Channel 1 according to its function. Turn the right Encoder one click to select a letter position. Turn the left Encoder to select a letter, character or space. When done, press **Menu/Exit**, **Next** or **Prev**.

CH2 Label Edit: This lets you label Channel 2 according to its function. Turn the right Encoder one click to select a letter position. Turn the left Encoder to select a letter, character or space. When done, press **Menu/Exit**, **Next** or **Prev**.

Exit: To exit the Advanced Features and go to the Basic Menu, press **Menu/Exit** once.

4.2.4 Operation Examples

Operation Example 1
How to set the CH1 input sensitivity using the LCD Control Screen:
1. After power-up, press **Menu/Exit.** The first menu item appears: the Contrast screen.
2. Press **Next** until you see "CH1 Sensitivity."
3. Turn an **Encoder** to set the sensitivity. NOTE: If you do not see the sensitivity you want, try changing the Maximum Analog Input level (see below).
4. Press **Menu/Exit**.

Operation Example 2
How to set the Maximum Analog Input level using the LCD Control Screen:
1. After power-up, press **Menu/Exit.** The first menu item appears: the Contrast screen.
2. Press **Next** until you see "Advanced Features."
3. Push an **Encoder** knob.
4. Press **Next** until you see "Maximum Analog Input."
5. Press an **Encoder** to change the maximum analog input level.
6. Press **Menu/Exit**.

4 Advanced Operation

4.3 Presets

4.3.1 Introduction

Your I-Tech amplifier has a wide variety of onboard Digital Signal Processing (DSP). Some applications for this DSP are speaker configuration (setting the drive levels, frequency bands, delays and limiting for your particular speakers), EQ, filtering, compression, and much more. Those functions are described in Section 4.6. IQwic software lets you adjust the DSP settings, such as filter slope, compression ratio, EQ frequency bands, and so on.

A **preset** is a group of DSP settings that configure the amp for a specific application. For example, you might use one preset that optimizes the amp's DSP for a JBL Vertec Line Array. You might use another preset that sets up the DSP for a stereo pair of loudspeakers of your choice. You can choose any of ten presets with the LCD Control Screen.

The I-Tech amplifier works with three types of presets:
1. Installed presets. Some presets are already installed in your I-Tech amplifier. You access them with the LCD Control Screen as described above. When recalled, each preset will automatically set the DSP parameters for a particular application.
2. User presets. Using IQwic, you can create your own custom DSP presets, label them, and send them to the I-Tech amplifier. The amp stores those presets in firmware. You can recall those presets from the LCD Control Screen.
3. Downloadable presets. Crown and JBL engineers have designed presets that are optimized for various JBL loudspeakers, such as Vertec Line Arrays. You can download presets from the IQ website at www.IQaudiosystems.com. Then in IQwic, send the preset files to the I-Tech amplifier, where you can recall them from the LCD Control Screen.

We will describe each type of preset in detail.

4.3.2 Installed Presets

To select a preset that came installed in your amplifier:
1. Press the **Menu/Exit** button below the LCD Control Screen.
2. Press **Next** until you see "Speaker Preset."
3. Turn an Encoder knob until you see the preset number you want to recall.
4. Press the Encoder knob to select that preset number.
The preset will automatically set the DSP parameters for that particular application.

4.3.3 User Presets

User presets are DSP presets that you set up. This is the basic procedure:
1. Adjust the DSP settings as desired in the IQwic software (not with the LCD Control Screen).
2. Save this group of settings as preset. Give it a label.
3. Download the preset to the I-Tech amplifier. See the Presets Help file in IQwic for details. Basically, you will open and engage a data frame.
4. Select that preset from the LCD Control Screen. The preset will automatically set the DSP parameters as you set them up in IQwic.

Setting the parameters of the DSP in the I-Tech amplifier is done using the IQwic software, not by the amplifier's LCD Control Screen. For example, if you want to set filter Q, compression ratio, or graphic EQ, you would do so within the IQwic software.

Adjusting DSP parameters within IQwic can be done in two ways: with a software Wizard or directly. The Wizard asks a series of questions to help you set up DSP parameters for loudspeakers.

If you need to do more advanced control than the Wizard offers, you can set the parameters directly. If you need assistance, in IQwic select **Help**, then select **Adjusting DSP**.

After setting the DSP parameters as desired,
1. Save them as a preset in IQwic. Presets are stored and recalled through the Presets Page in IQwic. See the Presets Help file in IQwic for details.
2. Download the preset to the I-Tech amplifier. See the Presets Help file in IQwic for details. Basically, you will open and engage a data frame.
3. When you want to recall the preset, select it on the LCD Control Screen.

4.3.4 Downloadable Presets

Crown and JBL engineers have designed I-Tech DSP presets that are optimized for various JBL loudspeakers, such as Vertec Line Arrays. To use them, follow this procedure:
1. Go to the I-Tech website at www.crownaudio.com/itech/.
2. Select Downloads.
3. Click on the preset of your choice. It will download to your computer.
4. In IQwic, select File > Open. Browse to the downloaded preset file and open it.
5. In IQwic, see the Help file on Presets for details on downloading the preset to an I-Tech amplifier. Basically, you will open and engage a data frame. The file will overwrite the preset you designate.
6. Recall the preset from the LCD Control Screen. Then your amp will be configured to work with the specified loudspeaker model.

4.4 Digital Audio Options (AES/EBU - CobraNet)

Digital audio inputs allow you to keep the amplifier input signals in the digital domain. Keeping the input signal digital reduces the number of Digital-to-Analog and Analog-to-Digital conversions. This provides better sound quality and reduces pickup of electrical interference.

The AES/EBU connector provides the most widely accepted format. A CobraNet connection is offered only in I-Tech models that have a CN suffix. CobraNet handles both digital audio and IQ networking on a single cable.

There are two ways to connect a digital-audio signal to the I-Tech amplifier:
1. In non-CN models, connect an AES/EBU signal to the AES/EBU connector on the rear panel.
2. In CN models, feed digital audio into a CobraNet network line. Connect the line (a Category 5 cable) to the Network connector on the amplifier rear panel.

4 Advanced Operation

4.5 TCP/IQ Networking

4.5.1 Introduction

I-Tech amps connect directly to IQ networks with TCP/IQ protocol. This permits extensive amp and speaker diagnostics and control by computer. For example, your amplifier's DSP functions can be controlled and monitored by a computer running IQwic software.

The computer connects to the amplifier on a TCP/IQ network via a Category 5 cable plugged into the Network connector on the back of the amplifier. The TCP/IQ format uses off-the-shelf, fast (100 Mb) Ethernet connections. CobraNet-equipped I-Tech models let you plug in a single cable for both networking and digital audio.

Every component in a TCP/IQ network is identified by a unique address. Before you set up a TCP/IQ network with addressing, it's important to understand all the terms involved. The following glossary explains network terminology. It is arranged in logical order rather than alphabetical order.

4.5.2 Glossary

Network: A group of interconnected components, such as a central computer, network switching equipment, and other computers or devices.

TCP/IQ network: A network made of a computer, network switching equipment, and other audio devices such as IQ-PIP cards plugged into power amps. Since each I-Tech amp connects directly to a network, each amp is also a network component.

Subnet: A small network within a larger network. For example, a TCP/IQ audio network might be a subnet of a venue's network, which could include computers throughout the building. Or an audio network might be divided into subnets. For example, one audio subnet might be for the house system and another audio subnet might be for the paging system.

IP address: An identifier for a computer or device on a TCP/IP network. Each device in a network has its own IP address to identify it. Example: 126.126.17.42. Networks using the TCP/IP protocol route messages based on the IP address of the destination. An IP address is made of four numbers separated by periods. Each number can be zero to 255. The last number can never be a zero or 255. For example, 126.126.17.1 could be an IP address. 126.126.17.0 would not be a valid IP address.

A TCP/ IP or IP address has two parts: the NETWORK ID and the HOST ID. The NETWORK ID identifies the network, and the HOST ID identifies either the subnet and device, or just the device if there is no subnet.

The **subnet mask** is a code that indicates which part of the TCP/IP address is the NETWORK ID and which part is the HOST ID. In subnet-mask code, 255 means "This part of the address is the NETWORK ID".

Example:
Suppose the IP ADDRESS of a device is 126.126.17.42
and the SUBNET MASK is 255.255.0.0.

That means, (126.126) is the NETWORK ID. The remaining set of numbers (17.42) is the HOST ID. If your audio network stands alone (it is not part of a larger network) then the HOST ID identifies each device in the network.

If your audio network is part of a venue's larger network, your network is actually a sub-network or subnet. In this case, the HOST ID can be further divided into two or more parts. The first part is the SUBNET ID. The other part is the DEVICE ID. The first part of the HOST ID identifies the subnet of your audio system, and the remaining part identifies the particular device within that subnet.

So in this case, a complete IP address is in the form
NETWORK ID - SUBNET ID - DEVICE ID.

All devices in the network have the same network ID. All devices in a subnet have the same subnet ID.

There are many resources available on the Internet for IP and subnet calculation. For a stand-alone system, Crown has provided a worksheet of a tested configuration later in this section.

DHCP (Dynamic Host Configuration Protocol): This is a protocol for automatically assigning IP addresses to devices on a network. With dynamic (DHCP) addressing, a device might have a different IP address every time it connects to the network. If a computer is NOT connected to a network with a DHCP server, the computer will place a default network ID into the TCP/IP address and Subnet Masks.

TCP/IQ does not use DHCP. A computer attached to a TCP/IQ network must have its IP addresses assigned statically (manually).

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4.5.3 Install the Wiring

IMPORTANT: Please read the wiring rules below before installing the wiring. If your computer does not communicate with the network devices after installation and addressing, re-read this section, as well as Section 4.5.4 on TCP/IQ addressing rules.

Connect each device to the network through its own cable in a Star Network. Do not connect them in a serial fashion (as was done with the previous IQ current loop method).

Make sure each device has its own Category 5 certified cable connecting it to a central concentrator, most often a switch (as in Figure 4.1).

Detailed instructions follow.

IT-4000, 6000, 8000 only:
Using a standard Category 5 cable, connect the network connector to a 100 Mb port on an Ethernet switch that is used to form the TCP/IQ control network. For more detail see Section 9 TCP/IQ Network Basics. If the amplifier is not to be connected to a TCP/IQ control network, it can be temporarily connected to a computer's Ethernet port with a crossover cable (TX and RX pairs switched) to set up the amplifier for desired operation.

CN models only:
1. Using a standard Category 5 cable, connect the Primary CobraNet connector to a 100Mb port on the Ethernet switch that is used to form the CobraNet network. For more detail, see Section 4.7. We highly recommend that the CobraNet be a stand-alone or separate-network LAN. If network redundancy is required, use a standard CAT5 cable to connect the Secondary CobraNet connector to a 100Mb port on the auxiliary CobraNet network.TCP/IQ control is also available over the CobraNet network using IQWic software.

2. Connect the audio input wiring. See Section 2.3.2 for more detail on audio wiring. The I-Tech amplifier allows the use of standard balanced audio inputs to act either as CobraNet backup, an emergency override of CobraNet audio, or as an audio input to the CobraNet network. See Section 4.7.1 for additional details.

3 Reconnect the amplifier's power cord.

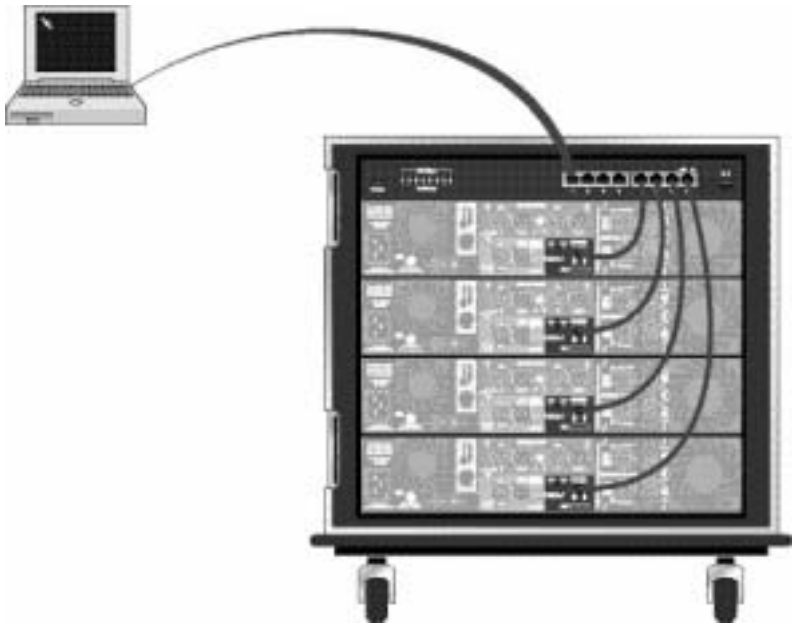

Figure 4.1
TCP/IQ Network Wiring

4.5.4 The Network Wizard

If you are setting up a dedicated audio network that is not part of another network, you can use the Network Wizard to set up your network easily.
1. Open IQwic.
2. Select Setup > Network Wizard.
3. Follow the instructions on the screen.
4. When done, skip to Section 4.6.

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4.5.5 TCP/IQ Addressing Rules

In the next section, you will be assigning TCP/IP addresses to the devices in your network. When you do so, be sure to follow the addressing rules below. Otherwise, the computer may not communicate with the devices.

1. Turn off DHCP (automatic addressing). This will be done in Instruction 1C, described later.

2. Assign each device a static (fixed) IP address. An IP address is made of four numbers separated by periods. Each number can be zero to 255. The last number can never be a zero or 255. For example, 126.126.17.1 could be an IP address. 126.126.17.0 would not be a valid IP address.

3. Make sure that the computer and all the devices have the same NETWORK IDs in their addresses. This tells the computer that all those devices are on the same network. Various tools are available to determine whether devices are on the same network. In TCP/IQ utility described later, if items are NOT on the same network, they are highlighted in the list.

4. Make sure that each component has its own TCP/IP address, and there are no duplicate addresses. The same holds true for IQ addresses.

5. Assign a subnet mask. Make it the same for all devices on the network. If the network you are assembling will interconnect with other networks, your network is considered to be a subnet within the larger network. Check with the network administrator to determine the proper Subnet Mask for your subnet.

If you have a stand-alone network, set the Subnet Mask to 255.255.0.0 for all components, including the computer.

Note: Just because two components have the same subnet mask does not mean that they are on the same network. As we said, the subnet mask just tells what part of the TCP/IP address is the Network ID.

4.5.6 TCP/IQ Setup

This example is based on a stand-alone system using switches and routers. The screen captures were done in Windows 2000; your exact configuration may vary. If your computer uses a network for other applications, please check with your Information Technology Department before making any changes. Section 4.5.7 includes a helpful worksheet for assigning addresses.

1. Select Settings > Control Panel > Network Connections (Figure 4.2). Set a static TCP/IP address and Subnet mask on the master computer. Document the address and mask.

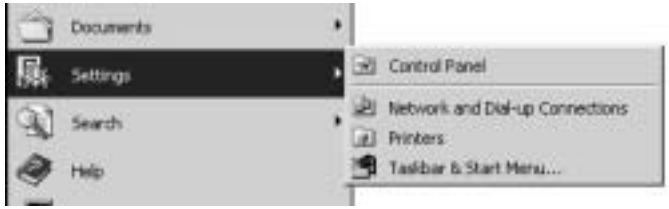

Figure 4.2 Selecting Settings > Control Panel

1A. Right-click on LAN Connections. Then select Internal > Properties (Figure 4.3).

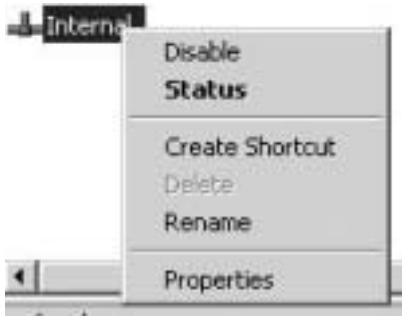

Figure 4.3
Result of Clicking LAN Connections > Internal

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1B. Once the Properties window opens (Figure 4.4), click on Internet Protocol (TCP/IP).

Figure 4.4 Internal Properties Window

The Internet Protocol (TCP/IQ) Properties window appears (Figure 4.5). Disable Virtual Private Network or other encryption settings.

See Section 4.5.7, TCP/IQ Addressing Worksheet, later in this document. Open the supplied Excel worksheet called IQ Worksheet.XLS.

1C. We recommend that you uncheck "Obtain an IP address automatically", and check "Use the following address." If you decide to set an IP address manually, specify an IP address. The IP address is four numbers between 1 and 255 separated by periods. For example, 126.126.0.1.

Select a subnet mask. The subnet mask is four numbers between 1 and 255 separated by periods. For example, 255.255.0.0.

1D. Click OK and close the Control Panel. At this point, some computer operating systems will require a restart.

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 4.5 Internet Protocol (TCP/IP) Properties Window

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2. Select IQ Systems > IQwic > TCPIQ Utility (Figure 4.6). This launches the TCPIQ Utility on the master computer.

Figure 4.6 Selecting IQ Systems > IQwic > TCPIQ Utility

2A. The master computer should discover the TCP/IQ products (Figure 4.7). If not, please re-read Section 4.5.3 on wiring rules and Section 4.5.5 on addressing rules. Also read Chapter 5, Troubleshooting.

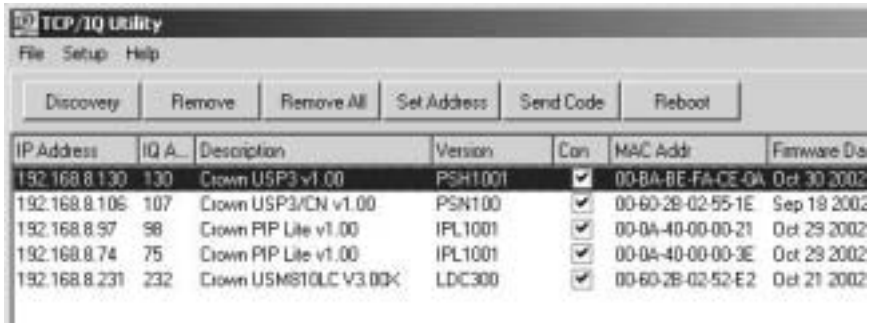
TCP/IQ Utility
File Setup Help
Discovery
Remove
Remove All
Set Address
Send Code
Reboot
IP Address IQ A... Description Version Con MAC Addr Firmware Da
192.168.8.130 130 Crown USP3 v1.00 PSH1001 00-BA-BE-FA-CE-0A Oct 30 2002
192.168.8.106 107 Crown USP3/CN v1.00 PSN100 00-60-2B-02-55-1E Sep 19 2002
192.168.8.97 98 Crown PIP Lite v1.00 IPL1001 00-0A-40-00-00-21 Oct 29 2002
192.168.8.74 75 Crown PIP Lite v1.00 IPL1001 00-0A-40-00-00-3E Oct 29 2002
192.168.8.231 232 Crown USM810LC V3.00K LDC300 00-60-2B-02-52-E2 Oct 21 2002

Figure 4.7 Example of Discovered Components

2B. Once TCP/IQ Utility has launched, select a single component and click on Set Address. In the Set Address window (Figure 4.8), set up a TCP/IQ address—it must be unique. Then set up the same Subnet mask for all of the components as well as the master computer. Set the IQ address, and select Send Code.

2C. Close the software. Repeat as necessary.

Figure 4.8 Set Address Window

3. Launch IQwic (Figure 4.9) and run a roll call. If there are problems, please re-read Section 4.5.3 on wiring rules and Section 4.5.5 on addressing rules. Also read Chapter 5, Troubleshooting.

Figure 4.9 Selecting IQ Systems > IQwic

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4.5.7 TCP/IQ Addressing Worksheet

Table 4 is an example of valid TCP/IP addresses on a stand-alone network. If the TCP/IQ network is going to be shared with other people, check with the Network Administrator for their addressing scheme. Without getting into all of the networking rules, the table lists approximately 20 network addresses out of a possible 65,534 addresses on this network. There are other addresses that are valid; these are just shown as a starting point.

• The Subnet Mask for all components, including the computer, needs to be set to 255.255.0.0.

• Each computer running IQwic software must have a subnet mask of 255.255.0.0. It also must be assigned one of the addresses listed on the following table.

• A space has been left to the right of all the addresses. This area is for your notes, such as the IQ address or the component type.

In the CD-ROM that came with your I-Tech amplifier is an Excel spreadsheet that you can use to keep track of TCP/IQ addresses.

Table 4

EXAMPLE OF AN IQ ADDRESSING WORKSHEET

ADDRESS	IQ ADDRESS	MODEL	DESCRIPTION	CHANNEL 1	CHANNEL 2
126.126.0.1			COMPUTER		
126.126.0.2	2	I-T8000 #1	RACK ROOM	LEFT CLUSTER	RIGHT CLUSTER
126.126.0.3					
126.126.0.4					
126.126.0.5					
126.126.0.6					
126.126.0.7					
126.126.0.8					
126.126.0.9					
126.126.0.10					
126.126.0.11					
126.126.0.12					
126.126.0.13					
126.126.0.14					
126.126.0.15					
126.126.0.16					
126.126.0.17					
126.126.0.18					
126.126.0.19					
126.126.0.20					

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4.6 IQ-Controllable Onboard DSP

Crown's latest-generation Digital Signal Processing is built into the I-Tech amplifier. Its 24-bit/96kHz converters offer extremely low noise and extended dynamic range. When you use an I-Tech amp, the loudspeaker processors, crossovers, limiters and delays are in the onboard DSP – so you don't need those rack-mounted devices. This drastically cuts setup time, commissioning, rack space and costs.

The I-Tech's DSP can be monitored and controlled with a computer running IQwic software, and connected to the amplifier Network Connector by a TCP/IQ network Category 5 cable.

Some applications for this DSP are:
- Set up signal flow
- Optimize system gain structure
- Set up speaker configurations (set the drive levels, frequency bands, delays and limiting for your particular speakers)
- Set up EQ, filtering, compression, and much more.

Listed below are the available DSP functions.

4.6.1 User Presets

The control settings for all the functions can be stored as presets.Up to ten presets can be saved in the I-Tech amp's nonvolatile memory. Each preset can be named with a 30 character name describing its function, which is also stored in memory.
- The **Store Preset Control** saves the current setting to the specified preset.
- The **Recall Preset Control** recalls the specified preset settings.
- The **Preset Valid Monitor** indicates if a change has been made to any setting since the last time a preset has be saved or recalled.
- The **Last Stored or Recalled Preset Monitor** indicates what the Last Stored or Recalled preset is.

4.6.2 Clip Event Monitor

A clip detector is provided each channel. These monitors will indicate any clip condition (> 0.05% distortion) in the amplifier channel. The clip detectors also can indicate Thermal Level Control limiting or incorrect setting of Stereo/Bridge-mono mode in the LCD-screen menu.

4.6.3 Input Signal Level Monitor

The input signal level of each channel can be monitored. The measurement range is from +20dBu to –40dBu with 0.5dBu resolution. Each audio channel has the following monitors:

- **Analog Audio Input:** The audio input at the Balanced Audio Inputs of the I-Tech amplifier.
- **Switched Audio Input:** The audio input after the Input Audio Router.
- **CobraNet Audio Input (available in optional CN models, coming soon):** The audio input level from the selected CobraNet audio channel.

4.6.4 Output Signal Level Monitor

The output signal level of each channel can be monitored. The measurement range is from 0 dB to –40 dB with 0.5 dB resolution. The monitors are scaled so that 0 dB is referenced to the full rated output voltage of the amplifier.

4.6.5 Thermal Headroom Level Monitor

The thermal headroom level of each channel can be monitored with the IQ software. This level represents the percent of available power/thermal capacity that is currently being used within the output section of the amplifier. When the thermal headroom level reaches 100%, the amplifier cannot produce any more power and it will begin to protect the output devices by limiting their drive level. The thermal limiter feature of the I-Tech's DSP can be set to engage at a pre-selected thermal level.

4.6.6 Power/ Standby Control

Each channel can be independently turned on and off.

4.6.7 Signal Mute

The output signal of each channel can be independently muted. This function produces 60 dB or more of attenuation.

4.6.8 Polarity Inverter

The input signal polarity of each channel can be independently inverted.

4.6.9 Dynamic Gain Monitors (Ghost Faders)

These indicators let the user monitor the actual signal path gain. The actual gain may vary from the input attenuator settings as a result of compression and limiting. On standard IQwic software control panels, these indicators appear as flying ghost faders behind the input attenuator controls.

4.6.10 Amplifier Information

Information about the amplifier is stored in the IQwic software system inventory and is displayed on the software control panels. Information includes manufacturer, model, date code, and serial number.

4.6.11 User and Channel Labels

The I-Tech amplifier can store two user labels and two channel labels. These labels are 30-character strings that can be set by the user to indicate the function of the amplifier and its channels. For example, "LOWER RIGHT CLUSTER, FOR DELAY."

4.6.12 Line Voltage Monitor

The AC line voltage supplied to the amplifier can be displayed with this function. No user input is required.

4.6.13 Error Reporting

The I-Tech amplifier can detect four different error conditions per channel and errors in the AC line voltage. Each error type can be individually configured to report the error through the IQ network and/or the AUX port. Network reported errors appear in the IQ System® Error Window. The IQwic software offers many options to further report errors, including audible alerts, printout, email, pager, serial port and fax. The following describes each error source.

CLIP: The I-Tech can be configured to report if an excessive number of clip events occur in either amplifier channel. The clip events are consider an error if they exceed the defined count per the defined unit of time. The **Count** Control sets the maximum number of events before the error is reported. The range is 1 to 100. The **Time** Control defines the amount of time that the events are counted before starting the counting process over. Its range is 1 to 10 seconds. Note: Clip events are defined as the start of each clip and every 10 milliseconds the amplifier is in clip thereafter. Using a high count setting with a short time setting may result in clip error never being detected.

THERMAL: Errors can be generated for excessive temperature in the output section of the amplifier channel. The **Threshold** Control sets the level that, if exceeded, will generate the error report. This control has a range of 1 to 100%.

LOAD: If the load monitoring feature is activated, an error report can be generated if the load impedance moves outside the pre-selected range.

LINE VOLTAGE: The AC line voltage can be monitored and an error generated whenever the voltage is outside of the limits set by the software.

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4.6.14 Input Signal Compressor/Limiter

An input signal compressor/limiter is available for each channel. Five parameters control this feature:

Enable: Enables or disables this function.

Threshold: Sets the level, in dBu, above which the compressor begins to attenuate the input signal. This level corresponds to the input level meter reading. The compressor is "feed-forward," meaning that the level detection point is located before the gain control stage. The range is from +20 dBu to – 50 dBu.

Hysteresis: A "dead zone" that ensures a significant change before acting. The range is from 0 to 12 dB. It requires the signal to go above the upper threshold before engaging and to go below the lower threshold before releasing.

Attack Time: Sets the attack time of the compressor. The attack time is defined as the time it takes the compressor to attenuate the signal gain by 20 dB. The range is from 1 millisecond to 0.1 second.

Release Time: Sets the release time of the compressor. The release time is defined as the time it takes the compressor to increase the signal gain by 20 dB. The range is from 10 milliseconds to 10 seconds.

Compression Ratio: Sets the compression ratio of the compressor. The ratio is the relation between the amount of attenuation applied by the compressor verses the amount that the input signal is over the threshold. The available settings are 2:1 to 32:1.

Beyond the three controls for each channel, a single-control **Compressor Tie** connects the compressors together. The compressors are tied at their sense points, meaning that the greater of the two input signals will be used as stimulus for both compressors. Each compressor will still compress based on its individual threshold, attack, release and ratio settings.

4.6.15 Peak Voltage Limiter

This limits the peak voltage output of the amplifier. Four parameters control this limiter for each channel:

Enable: Enables or disables this function.

Threshold: Sets the level, in absolute voltage, which the limiter will allow from the amplifier. The range is from 12 V_{pk} to 255 V_{pk}.

Attack Time: Sets the attack time of the limiter. The attack time is defined as the time it takes the limiter to attenuate the output signal by 20 dB. The range is from 1 millisecond to 100 milliseconds.

Release Time: Sets the release time of the compressor. The release time is defined as the time it takes the limiter to increase the output signal by 20 dB. The range is from 10 milliseconds to 10 seconds.

4.6.16 Average Power Limiter

This limits the long-term output power of the amplifier. Four parameters control this limiter for each channel:

Enable: Enables or disables this limiter.

Threshold: Sets the average power level, in watts, which the limiter will allow from the amplifier channel. The range is from 10 watts to 10,000 watts. This level should be set to the connected loudspeaker's long-term power rating. Also you must enter the loudspeaker's nominal impedance.

Attack Time: Sets the attack time of the limiter. The attack time is defined as the time it takes the limiter to attenuate the output signal by 20 dB. The range is from 1 second to 30 seconds.

Release Time: Sets the release time of the compressor. The release time is defined as the time it takes the limiter to increase the output signal by 20 dB. The range is from 1 second to 30 seconds.

4.6.17 Clip Eliminator

This limiter monitors the clip events and attenuates the input signal to prevent amplifier clipping. The attack and release times are preset to optimum rates. Only one parameter controls this limiter. "Enable" enables or disables this limiter.

4.6.18 Limiter Tie

This control forces both channels to track by using the greatest (worst case) attenuation of any limiter from either channel. With this option disabled, each channel will independently take the greatest attenuation of its own four limiters (voltage, power, clip, thermal) and ignore the limiting of the other channel. Note that this function does not include the effects of the input compressors. To tie the input compressors, use the Compressor Tie function.

4.6.19 Load Supervision

The load supervision feature allows real-time monitoring of the load connected to each amplifier channel. When enabled, the I-Tech continuously monitors the amplifier output voltage and current, and calculates the long-term average load impedance. The measured load impedance is compared against the user-defined high and low limits. If either limit is exceeded, the status indicator and, if enabled, the IQwic Error Reporting functions alert the user of the problem. There are six controls and two indicators for each channel:

Enable: Enables or disables the load-supervision function.

High Limit: Sets the upper bound above which the system will report a "high" error status.

Low Limit: Sets the lower bound below which the system will report a "low" error status.

Nominal Load Impedance: Sets the expected average impedance for the connected load. This value determines the output signal level required for the test. This parameter is also used by the average power limiter to determine the expected power threshold. (See Section 4.6.16).

Report Error to Network: Enables Error Reporting to send an error report via the network so that high and low load conditions are reported to the IQ software.

Test Indicator: This indicator is active when the amplifier output signal is sufficient to allow load impedance calculation and test verification.

Low/Normal/High Indicator: This indicator shows the present status of the load impedance with respect to the user-defined high and low limits.

Z Average Monitor: Reports the actual calculated average load impedance in ohms. Its range is from 0 ohms to 250 ohms.

4.6.20 Memory Backup Configuration

In normal operation, the I-Tech amplifier stores all its settings in non-volatile memory. When the power is removed from the amplifier and then restored, the amplifier uses these backed-up settings for its functions. This feature can be disabled with the memory backup enable

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control. When the memory backup is disabled, the amplifier stops storing changes made to its settings. When the next power-up occurs the amplifier uses the settings that were active when the backup feature was disabled.

CAUTION: Care should be taken to backup "safe" levels for the input attenuator controls. It is possible for the memory backup feature to be disabled with "unsafe" levels stored. This may result in significantly greater system gain the next time power is reapplied to the amplifier.

4.6.21 Input Signal Router

Each channel of the I-Tech's signal processing has an Input Signal Router that allows the choice of audio signal that will be used by the channel. The user may choose one of the following configurations:

- **Analog Audio:** This is the audio input from the audio connector on the back panel of the amp. Choices for the Analog Audio input are Channel 1, Channel 2, or a sum of Channels 1 and 2.
- **Digital Audio:** This is the audio input from the AES/EBU connector on the back panel of the amp.

4.6.22 Filters

Each audio channel has five separate places where filters can be placed in the system. Up to 64 filters can be placed anywhere within the system. In addition to filtering, each possesses up to +/-24dB of gain. The following filters are available:

- Lowpass: Bessel 2-4, Butterworth1-4, and Linkwitz-Riley 4
- Highpass: Bessel 2-4, Butterworth1-4, and Linkwitz-Riley 4
- Lowshelf: Low-frequency shelving EQ
- Highshelf: High-frequency shelving EQ
- Lowpass EQ: Variable Q from 0.1 to 35
- Highpass EQ: Variable Q from 0.1 to 35
- Parametric EQ: Variable Q from 0.1 to 35
- All Pass: 1st and 2nd order

All Pass filters provide no gain change to the output, but provide a phase change at the selected frequency. This corrects the phase relationship of the output without a gain reduction, such as is found in other filters.

4.6.23 Delay (Latency)

Due to the nature of DSP processing, there is some inherent delay or latency within the I-Tech's DSP. These delays are:

- 1.13mS analog
- 2.36mS digital (44.1 kHz)

4.6.24 Noise Generator

Each channel has an independent uncorrected noise generator that allows noise to be mixed into the audio signal. This is useful for noise masking applications and testing. Each channel has the following controls:

- **Noise On/Off:** The channel's noise generator can be independently turned on.
- **Noise Type:** Full spectrum white noise or pink noise.
- **Noise Level:** A fader to allow the noise level to be controlled.

4.6.25 Sine-wave Generator

A sine-wave signal generator allows the mixing of a single tone into the audio signal. Typical applications can be for the injection of a high frequency tone (19kHz) into the signal in paging type system to continually drive the speaker, allowing continuous monitoring of the speaker load. The following controls exist:

- **Sine On/Off:** The sine-wave signal generator's function.
- **Sine Frequency:** Controllable from 20Hz to 20kHz.
- **Sine Level:** Each channel's sine-wave signal level can be independently controlled.

4.7 CobraNet Functions

The Network connector in I-Tech CN models accepts a CobraNet signal: digital audio and IQ control/monitor signals on a single cable.

CobraNet* is a licensed technology developed by Peak Audio, Inc. consisting of proprietary communications protocol, firmware and hardware. It allows reliable, deterministic transmission of digital audio over a 100Base-T Fast Ethernet network. The I-Tech models mentioned above operate as networked devices on a CobraNet network, and interface digital audio from the network to the amplifier.

This section describes the CobraNet control and monitoring features. These features are accessed via IQwic software. Please refer to the IQwic help files if you are unfamiliar with IQ software.

4.7.1 Input Signal Router

Each channel of the I-Tech's signal processing has an Input Signal Router that allows the choice of audio signal that will be used by the channel. The user may choose one of the following configurations:

- **CobraNet Audio:** This is the assigned CobraNet audio as setup in the CobraNet Input section of the software. See Section 9.2 for more details. Choices for the CobraNet Input are Channel 1, Channel 2, or a sum of Channels 1 and 2.
- **CobraNet with Analog Backup:** This allows the use of the Balanced Audio Inputs to be used as backup to the CobraNet audio should the network's audio be lost for any reason. In this mode, the amplifier will sense the loss of the CobraNet audio and will automatically switch to the chosen Balanced Audio Input until CobraNet network audio returns.

- **CobraNet with Analog Override:** If an external emergency override of the CobraNet audio is required, this mode will allow the automatic switching of the Balanced Audio Input over the CobraNet audio input if a signal is noticed on the Analog Input. When the Emergency Override is completed, the CobraNet audio will be routed to the channel after 10 seconds.

4.7.2 CobraNet Interface Parameters

The internal CobraNet Network Interface contains several parameters for control and monitor of status of the CobraNet network, and do not directly affect the IQ network. These variables can also be controlled and monitored through the CobraNet network using Calibrated** or other industry-standard SNMP-enabled network management software.

Conductor

Any CobraNet device can be configured to operate either as Network Conductor or a Performer:

- **Active Indicator:** This indicator, viewable in IQ software, reports the present Conductor status of the device. If the indicator is ON, the unit is operating as the network Conductor. When OFF, the unit is operating as a Performer.
- **Priority:** This parameter adjusts the priority level for becoming the Conductor. When set to zero, the I-Tech amplifier will never function as the Conductor, and when set to 255 it will always function as the Conductor. The higher the priority number, the more likely unit will act as the Conductor. The Priority object is stored in presets.

System Name

This parameter is user-settable to any alpha-numeric string of 30 characters or less. The intended use is to communicate a unique name for the particular device to a network. The System Name object is stored in presets.

System Description

This parameter is configured at the factory and is read-only. The intended use is to communicate a unique device description to a network.

*For the most comprehensive information available on CobraNet technology, visit Peak Audio's CobraNet website at www.peakaudio.com.

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System Location
This parameter is user-settable to any alpha-numeric string of 30 characters or less. The intended use is to communicate a unique description of the device location to a network. This object is stored in presets.

System Contact
This parameter is user-settable to any alpha-numeric string of 30 characters or less. The intended use is to communicate the designated contact person (in case of service or other network issue) to the network. This object is stored in presets.

Firmware Version
This parameter is configured at the factory and is read-only. The intended use is to communicate the presently loaded CobraNet module firmware version to a network.

MAC Address
This parameter is configured at the factory and is read-only. The setting defines a unique IEEE802-recognized address for use with any Ethernet based network.

IP Address
This IP address is for the CobraNet control ONLY. It is used by SNMP agents such as CobraCad™* to control CobraNet specific functions. This IP address should not be confused with the TCP/IQ's IP address that is used to control and monitor the amplifier.

4.7.3 CobraNet Input Routing

CobraNet input routing includes the following controls:

CobraNet Receive Bundles
The amplifier can receive four unique CobraNet Bundles (RxA, RxB, RxC, RxD). Each Bundle includes an "Active" indicator to indicate whether the particular Bundle is being actively transmitted onto the network.

CobraNet Receive Channels
Each CobraNet Bundle contains up to eight digital audio channels. Each channel is selected at its respective transmitter to contain none, 16-, 20- or 24-bit audio sample data. A total of two audio channels can be processed by the I-Tech amplifier at any one time. Any of the eight channels on a bundle can be can be routed to either of the two processing channel inputs on the I-Tech amplifier.

- **Channel Label:** Each received digital audio channel can be assigned a user-specified label to indicate intended use, source or other information. The label is stored in presets along with the bundle number and receive channel information.

4.7.4 CobraNet Output Routing

CobraNet output routing includes the following controls:

CobraNet Transmit Bundles
CobraNet-equipped amplifiers can transmit up to four unique CobraNet Bundles (TxA, TxB, TxC, TxD). Each Transmit Bundle includes the following controls and monitor functions:

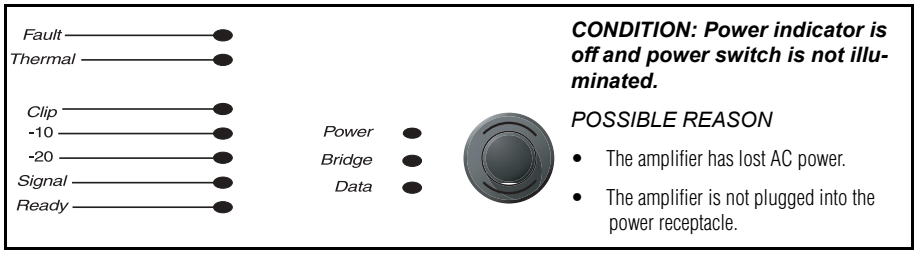
- **Receiver Count:** This meter reports the number of CobraNet nodes actively receiving the Bundle being sourced to the network by this bundle.
- **Transmit Position:** This meter reports the transmitter's relative position as assigned by the CobraNet Conductor. Lower numbers are transmitted before higher numbers.
- **Transmit Priority:** This control adjusts the relative priority for the particular transmitter. Higher numbers indicate a higher priority. One may choose to increase the transmitter priority for an emergency page microphone in a heavily loaded network. The Transmit Priority object is stored in presets.

CobraNet Transmit Channels
Each CobraNet Bundle can contain up to eight unique digital audio channels. Each channel is selected at its respective transmitter to contain none, 16-, 20- or 24-bit audio sample data. A total of 32 channels can be transmitted by a single I-Tech amplifier at any one time; however, only 4 channels can be sent on up to four Bundles. The CobraNet Transmit Channel object is stored in presets.

- **Channel Label:** Each transmitted digital audio channel can be assigned a user-specified label to indicate intended use, source or other information. The Channel Label object is stored in presets. The amplifier provides four audio channels onto the CobraNet network.
- **Output Amplifier Audio:** By sampling the actual output audio of the amplifier, CobraNet allows remote access and monitoring of each amplifier channel **at the output of the amplifier!** CobraNet extends the "Listen Bus" feature to any network user, allowing them to listen to the output of any networked amplifier from any location on the network.
- **Balanced Audio Inputs:** This allows the amplifier to be used not only as a CobraNet receiver for amplifier audio, it provides a remote access point to allow audio to go onto the CobraNet network. In applications where a single pair of audio inputs is required into CobraNet, this feature provides a very cost effective means of CobraNet Input.

*CobraCAD is a software tool that provides a simple graphic user interface for the design, configuration and monitoring of CobraNet networks. It is available for download from Peak Audio's website at www.peakaudio.com.

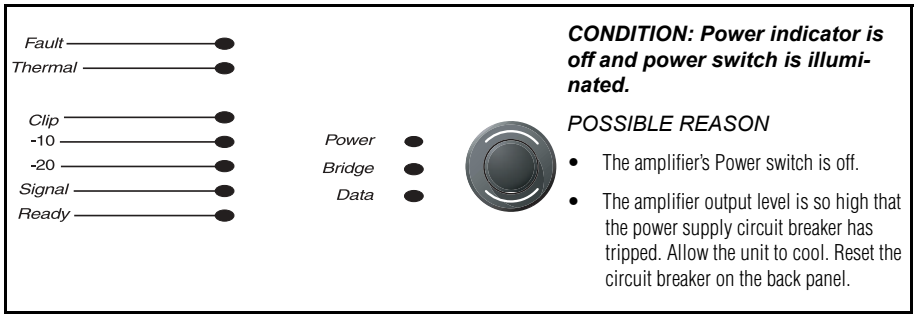
5 Troubleshooting



CONDITION: Power indicator is off and power switch is not illuminated.

POSSIBLE REASON

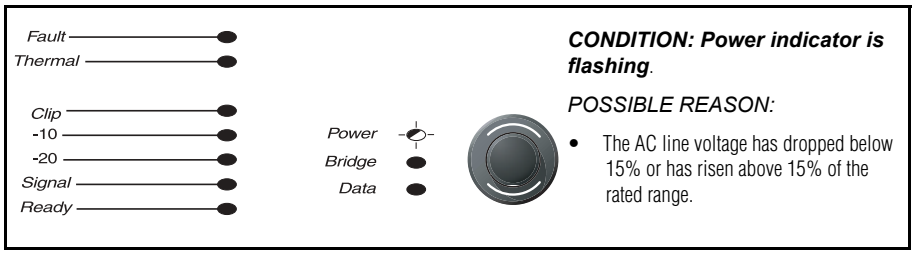
- The amplifier has lost AC power.
- The amplifier is not plugged into the power receptacle.



CONDITION: Power indicator is off and power switch is illuminated.

POSSIBLE REASON

- The amplifier's Power switch is off.
- The amplifier output level is so high that the power supply circuit breaker has tripped. Allow the unit to cool. Reset the circuit breaker on the back panel.

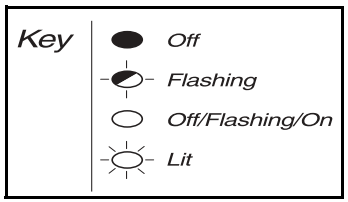


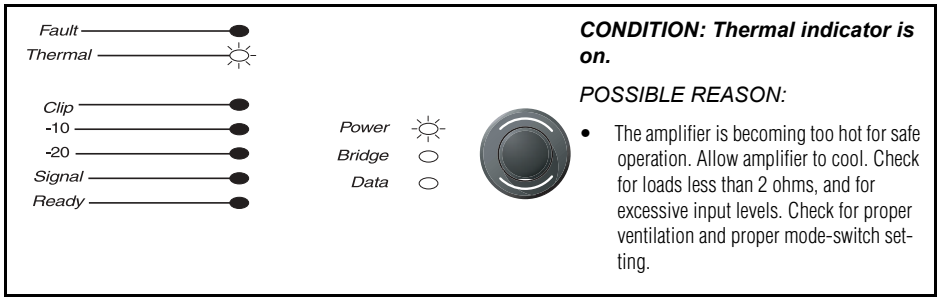
CONDITION: Power indicator is flashing.

POSSIBLE REASON:

- The AC line voltage has dropped below 15% or has risen above 15% of the rated range.

"Off/Flashing/On" means that the LED can be off, or flashing, or on.

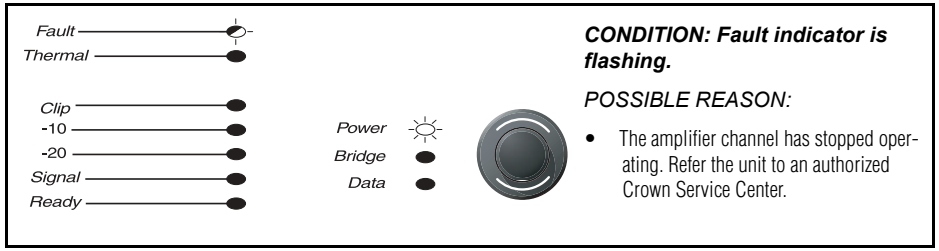




CONDITION: Thermal indicator is on.

POSSIBLE REASON:

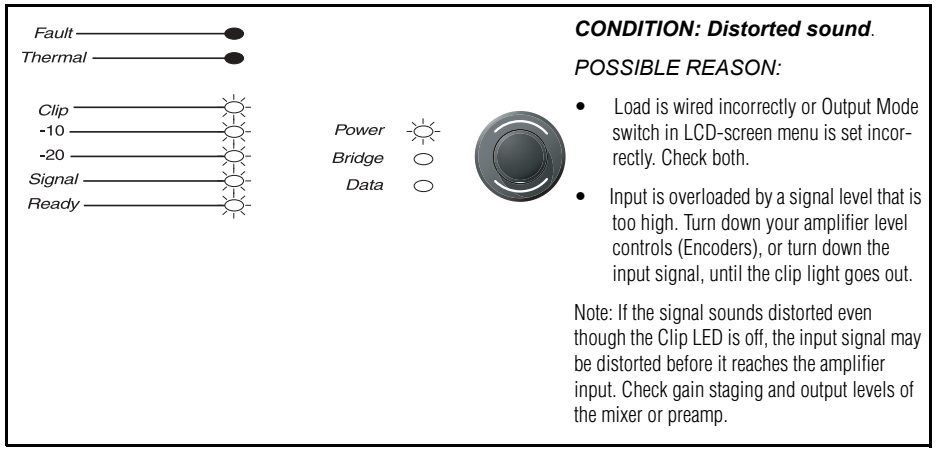
- The amplifier is becoming too hot for safe operation. Allow amplifier to cool. Check for loads less than 2 ohms, and for excessive input levels. Check for proper ventilation and proper mode-switch setting.



CONDITION: Fault indicator is flashing.

POSSIBLE REASON:

- The amplifier channel has stopped operating. Refer the unit to an authorized Crown Service Center.



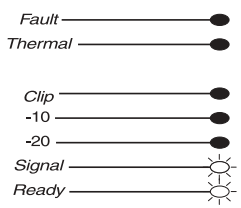
CONDITION: Distorted sound.

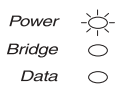
POSSIBLE REASON:

- Load is wired incorrectly or Output Mode switch in LCD-screen menu is set incorrectly. Check both.
- Input is overloaded by a signal level that is too high. Turn down your amplifier level controls (Encoders), or turn down the input signal, until the clip light goes out.

Note: If the signal sounds distorted even though the Clip LED is off, the input signal may be distorted before it reaches the amplifier input. Check gain staging and output levels of the mixer or preamp.

5 Troubleshooting

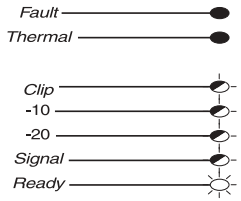


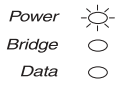


CONDITION: No sound, even though the amp has power. Power LED is on without flashing and the amp is receiving an input signal. Signal indicator is flashing.

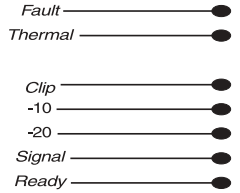
POSSIBLE REASON:

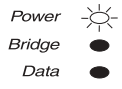
- Speakers not connected.
- Open circuit due to speaker failure.



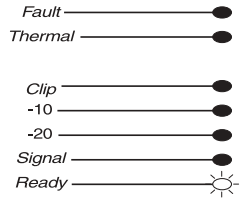


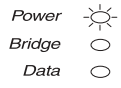
- There is a short on the amplifier output. First disconnect your speakers from the affected channel(s) one by one to determine if one of the loads is shorted.





- Ready LED is off. Channel has been set to standby mode via the IQ system.

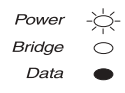




CONDITION: No input signal. Signal indicator is not flashing even though audio is applied, and the channel is ready.

POSSIBLE REASON:

- Input signal level is very low.
- Level controls (Encoders) are turned down.

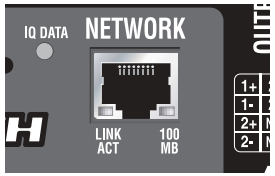


CONDITION: Data indicator not flashing, even though host computer IQ software is active.

POSSIBLE REASON:

- Cable between computer and amplifier is broken or not connected.

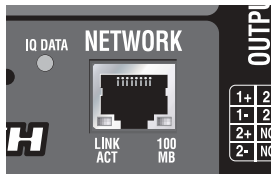
Note: Data indicator flashes only when the amplifier is polled for data, or is polled to see whether it is online.



CONDITION: Yellow LINK ACTIVITY indicator in Ethernet connector does not illuminate or flash.

POSSIBLE REASON:

- Ethernet link is broken.



CONDITION: Yellow LINK ACT indicator is on but green 100Mb indicator in Ethernet connector does not illuminate.

POSSIBLE REASON:

- Network connection is 10 Megabits.

CONDITION: Computer does not communicate with the network devices.

POSSIBLE REASON:

- Incorrect wiring. See Section 4.5.3 on wiring.
- IP Addressing is not done correctly. See Section 4.5.5 on addressing rules.

6 Specifications

6.1 Performance

Minimum Guaranteed Power	I-T4000	I-T6000	I-T8000
20 Hz - 20 kHz with 0.35% THD			
Stereo, 2 ohms (per ch.)	1800W	2500W	3500W
Stereo, 4 ohms (per ch.)	2000W	3000W	4000W
Stereo, 8 ohms (per ch.)	1250W	1500W	2100W
Bridge mono, 4 ohms	3600W	5000W	7000W
Bridge mono, 8 ohms	4000W	6000W	8000W
Performance	**I-T4000**	**I-T6000**	**I-T8000**
Input Sensitivity (volts RMS) for rated output	Adjustable in 0.1V steps from 1.4V to 7.75V	Adjustable in 0.1V steps from 1.4V to 7.75V	Adjustable in 0.1V steps from 1.4V to 7.75V
Voltage Gain for full rated power at 8 ohms	37.1 dB to 22.2 dB	37.9 dB to 23.0 dB	39.3 dB to 24.5 dB
Frequency Response (at 1 watt, 20Hz - 20 kHz)	± 0.25 dB	± 0.25 dB	± 0.25 dB
Signal to Noise Ratio below rated full-bandwidth power, A-weighted	> 105 dB	> 105 dB	> 105 dB
Total Harmonic Distortion (THD) at full rated power	< 0.35%	< 0.35%	< 0.35%
Intermodulation Distortion (IMD) 60 Hz and 7 kHz at 4:1, from full rated output to –35 dB	< 0.35%	< 0.35%	< 0.35%
Maximum Input Level	+15 dBu or +22 dBu, depending on input sensitivity	+15 dBu or +22 dBu, depending on input sensitivity	+15 dBu or +22 dBu, depending on input sensitivity
Latency (analog, digital inputs)	Analog: 1.13 mS. Digital: See Table 5 below.	Analog: 1.13 mS. Digital: See Table 5 below.	Analog: 1.13 mS. Digital: See Table 5 below.
A/D, D/A Converters	24-bit 96 kHz Cirrus Logic	24-bit 96 kHz Cirrus Logic	24-bit 96 kHz Cirrus Logic
Digital Input	AES/EBU, 16-24 bit, 32-48 kHz. Onboard sample rate converter.	AES/EBU, 16-24 bit, 32-48 kHz. Onboard sample rate converter.	AES/EBU, 16-24 bit, 32-48 kHz. Onboard sample rate converter.
Network	Onboard TCP/IQ, compatible with standard 100Mb Ethernet hardware	Onboard TCP/IQ, compatible with standard 100Mb Ethernet hardware	Onboard TCP/IQ, compatible with standard 100Mb Ethernet hardware
DSP	24-bit conversion with 32-bit, floating-point DSP processing	24-bit conversion with 32-bit, floating-point DSP processing	24-bit conversion with 32-bit, floating-point DSP processing
Attenuators	Speed-sensitive rotary encoders, 0.5 dB steps, range 0 to –90 dB.	Speed-sensitive rotary encoders, 0.5 dB steps, range 0 to –90 dB	Speed-sensitive rotary encoders, 0.5 dB steps, range 0 to –90 dB

Table 5 Latency (digital inputs)

Sample rate	Latency
32 kHz	2.74 mS
44.1 kHz	2.36 mS
48 kHz	2.28 mS
96 kHz	1.81 mS

6 Specifications

Performance	I-T4000	I-T6000	I-T8000
Damping Factor (8 ohms): 20 Hz to 100 Hz	> 5000	> 5000	> 5000
Crosstalk (below rated power, 20 Hz to 1 kHz)	> 80 dB	> 80 dB	> 80 dB
Common Mode Rejection (CMR) (20 Hz to 1 kHz)	> 50 dB	> 50 dB	> 50 dB
DC Output Offset (Shorted input)	< ± 3 mV	< ± 3 mV	< ± 3 mV
Input Impedance (nominal)	20 kilohms balanced, 10 kilohms unbalanced	20 kilohms balanced, 10 kilohms unbalanced	20 kilohms balanced, 10 kilohms unbalanced
Load Impedance (Note: Safe with all types of loads) Stereo Bridge Mono	 1-2-4-8-16 ohms 2-4-8 ohms	 1-2-4-8-16 ohms 2-4-8 ohms	 1-2-4-8-16 ohms 2-4-8 ohms
Required AC Mains	Universal AC input, 100-240VAC (±15%), 50/60 Hz. Max. AC mains voltage 277VAC.	Universal AC input, 100-240VAC (±15%), 50/60 Hz. Max. AC mains voltage 277VAC.	Universal AC input, 100-240VAC (±15%), 50/60 Hz. Max. AC mains voltage 277VAC.
AC Line Connector	USA, UK, European, Australia, India	USA, UK, European, Australia, India	USA, UK, European, Australia, India
Construction	**I-T4000**	**I-T6000**	**I-T8000**
Ventilation	Flow-through ventilation from front to back	Flow-through ventilation from front to back	Flow-through ventilation from front to back
Cooling	Dual-zone, microprocessor controlled, continuously variable speed fans	Dual-zone, microprocessor controlled, continuously variable speed fans	Dual-zone, microprocessor controlled, continuously variable speed fans
Dimensions	EIA Standard 19-inch rack mount width (EIA RS-310B), 3.5-inch (8.9-cm) height, 16.2-inch (41.1-cm) depth behind front mounting surface	EIA Standard 19-inch rack mount width (EIA RS-310B), 3.5-inch (8.9-cm) height, 16.2-inch (41.1-cm) depth behind front mounting surface	EIA Standard 19-inch rack mount width (EIA RS-310B), 3.5-inch (8.9-cm) height, 16.2-inch (41.1-cm) depth behind front mounting surface
Weight Net Shipping	 28 pounds (12.7 kg) 36 pounds (16.3 kg)	 28 pounds (12.7 kg) 36 pounds (16.3 kg)	 28 pounds (12.7 kg) 36 pounds (16.3 kg)

6 Specifications

6.2 Charts

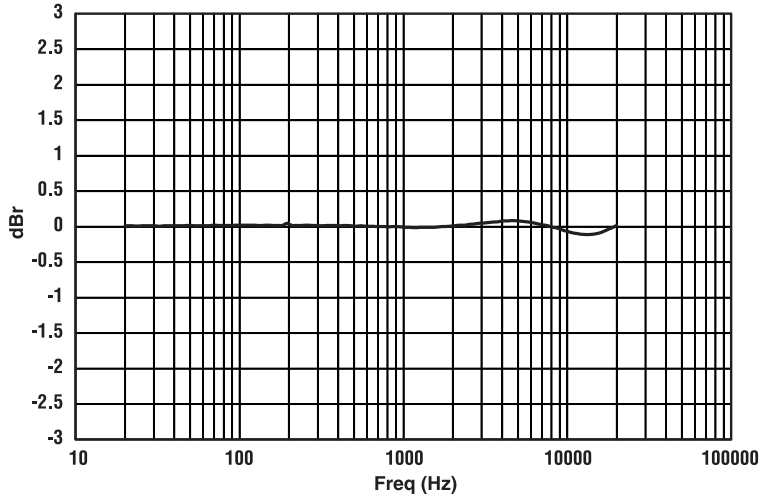


Figure 6.1 Typical Frequency Response (1W)

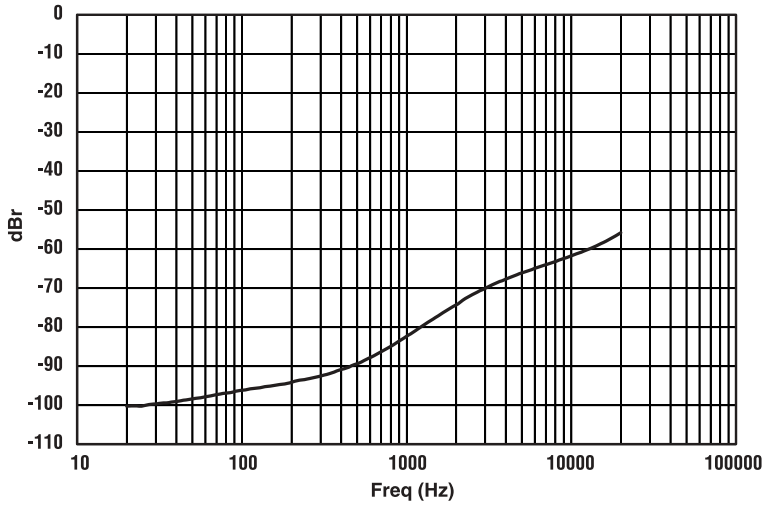


Figure 6.2 Typical Crosstalk vs. Frequency

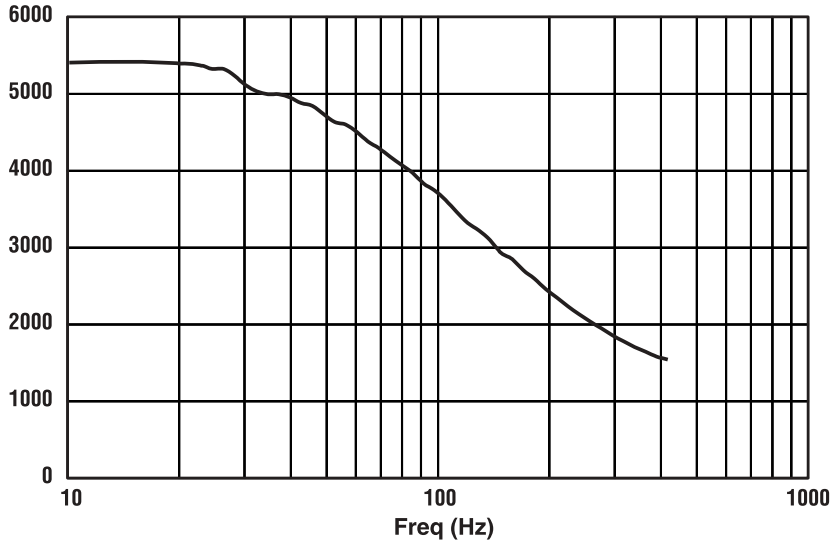


Figure 6.3 Typical Damping Factor vs. Frequency

7 AC Power Draw and Thermal Dissipation

I-Tech 4000 AC Current Draw and Thermal Dissipation:
Pink noise 12dB crest factor, bandwidth limited 22Hz to 22kHz.
Typical line impedance used.
Data based on both channels driven.

I-T4000										
		120VAC		208VAC		230VAC			Thermal Dissipation	
	Load	Line Current 120VAC	Watts Out Per 1A Amp Line Current	Line Current 208VAC	Watts Out Per 1A Amp Line Current	Line Current 230VAC	Watts Out Per 1A Amp Line Current	Watts Dissipated	Btu/hr	kcal/hr
Idle (sleep mode)		0.8		0.95		0.9		53	182	157
Idle (awake)		1.6		1.4		1.3		172	587	505
1/8th Power Pink Noise Typical of program material just at clip.	8 Ohms/Ch. 16 Ohms Bridge	5.3	59.6	3.4	94.6	3.1	102.6	305	1040	262
	4 Ohms/Ch. 8 Ohms Bridge	7.8	64.9	4.7	106.9	4.4	116.3	414	1413	356
	2 Ohms/Ch. 4 Ohms Bridge	8.0	58.1	4.8	96.1	4.4	106.0	476	1625	410
1/3rd Power Pink Noise Typical of program material with severe clipping.	8 Ohms/Ch. 16 Ohms Bridge	10.9	77.1	6.6	126.2	6.0	139.9	437	1491	376
	4 Ohms/Ch. 8 Ohms Bridge	17.8	77.0	10.5	129.1	9.5	142.1	711	2426	612
	2 Ohms/Ch. 4 Ohms Bridge	17.7	70.3	10.7	115.3	9.4	128.7	824	2814	709

7 AC Power Draw and Thermal Dissipation

I-Tech 6000 AC Current Draw and Thermal Dissipation:

Pink noise 12dB crest factor, bandwidth limited 22Hz to 22kHz.
Typical line impedance used.
Data based on both channels driven.

I-T6000										
		120VAC		208VAC		230VAC			Thermal Dissipation	
	Load	Line Current 120VAC	Watts Out Per 1A Amp Line Current	Line Current 208VAC	Watts Out Per 1A Amp Line Current	Line Current 230VAC	Watts Out Per 1A Amp Line Current	Watts Dissipated	Btu/hr	kcal/hr
Idle (sleep mode)		1.0		1.0		0.95		60	205	177
Idle (awake)		2.1		1.7		1.6		225	767	660
1/8th Power Pink Noise Typical of program material just at clip.	8 Ohms/Ch. 16 Ohms Bridge	6.6	57.6	4.2	91.2	3.8	99.8	392	1338	337
	4 Ohms/Ch. 8 Ohms Bridge	11.6	65.7	7.0	108.8	6.3	120.4	593	2024	510
	2 Ohms/Ch. 4 Ohms Bridge	11.5	55.9	6.8	96.5	6.2	105.3	695	2373	598
1/3rd Power Pink Noise Typical of program material with severe clipping.	8 Ohms/Ch. 16 Ohms Bridge	13.6	74.4	8.1	125.3	7.4	137.2	579	1977	498
	4 Ohms/Ch. 8 Ohms Bridge	27.6	73.9	16.0	127.2	14.3	141.0	1149	3921	988
	2 Ohms/Ch. 4 Ohms Bridge	25.0	67.0	14.9	113.5	13.6	124.3	1223	4173	1052

7 AC Power Draw and Thermal Dissipation

I-Tech 8000 AC Current Draw and Thermal Dissipation:
Pink noise 12dB crest factor, bandwidth limited 22Hz to 22kHz.
Typical line impedance used.
Data based on both channels driven.

I-T8000										
		120VAC		208VAC		230VAC			Thermal Dissipation	
	Load	Line Current 120VAC	Watts Out Per 1A Amp Line Current	Line Current 208VAC	Watts Out Per 1A Amp Line Current	Line Current 230VAC	Watts Out Per 1A Amp Line Current	Watts Dissapited	Btu/hr	kcal/hr
Idle (sleep mode)		0.9		1.1		1.0		62	212	183
Idle (awake)		2.0		1.8		1.6		213	726	625
1/8th Power Pink Noise Typical of program material just at clip.	8 Ohms/Ch. 16 Ohms Bridge	8.3	63.6	5.1	103.3	4.7	111.8	441	1504	379
	4 Ohms/Ch. 8 Ohms Bridge	14.6	68.8	8.7	115.2	8.0	124.5	701	2394	603
	2 Ohms/Ch. 4 Ohms Bridge	14.2	62.9	8.2	106.1	7.7	113.6	764	2607	657
1/3rd Power Pink Noise Typical of program material with severe clipping.	8 Ohms/Ch. 16 Ohms Bridge	18.1	77.4	11.0	128.3	9.9	142.0	715	2439	615
	4 Ohms/Ch. 8 Ohms Bridge	35.1	76.3	20.8	128.6	18.7	144.2	1370	4677	1179
	2 Ohms/Ch. 4 Ohms Bridge	33.9	69.2	19.9	118.0	17.9	131.1	1589	5425	1368

8 Advanced Features

8.1 Protection Systems

Your Crown amplifier provides extensive protection and diagnostic capabilities, including thermal level control, fault indicators, high-pass filtering, DC protect, AC under/over voltage protection, inrush limiting, and variable-speed fans.

8.1.1 Thermal Level Control (TLC)

If the amplifier becomes too hot for safe operation, the TLC will engage the input compressor and the clip LED will illuminate. By compressing the input, the amplifier will not generate as much heat and will have a chance to cool down. The degree of compression is proportional to the amount of overheating. This feature allows the show to go on, rather than having the amplifier shut down.

8.1.2 Circuit Breaker

If the current draw of the amplifier exceeds safe limits, this breaker automatically disconnects the power supply from the AC mains.

8.2 Global Switching Power Supply with PFC

Thanks to its global power supply, the I-Tech amplifier works anywhere in the world. There's no need to reset an AC mains voltage switch, and no need to order a special model. The amp will work or meet all specs on 100V - 240VAC, 50/60 Hz.

Crown's Switching Power Supply minimizes the amplifier's weight.

Typical non-switching power supplies require large, heavy transformers in order to produce the required power at the output stage. These transformers must be large to operate at 50 to 60 Hz (standard AC supplied by the power company).

By contrast, switching power supplies can operate with a much smaller (and lighter) transformer because they first convert the AC up to a much higher frequency, thereby reducing waste.

Power Factor Correction (PFC) controls how your amplifier draws current from the AC mains. Instead of drawing high-magnitude current spikes that reduce the capacity of your power distro (and couple noise into other system components), PFC draws a smooth and quiet current waveform that is in phase with the mains voltage waveform. PFC allows you to reduce the size and weight of your power distribution and improve the performance of your signal processors.

8.3 3rd Generation Class I Circuitry

Class I (BCA, Balanced Current Amplifier) Interleave technology allows high levels of power output without all the associated heat found in a conventional amplifier. This highly efficient design also provides accurate, uncolored sound with very low distortion and a high damping factor for tight, clean bass response. And it can deliver more power to reactive loads than conventional dissipative designs (comfortably driving the latest high-technology transducers). Class I also reduces current draw of the AC mains, providing energy conservation.

8.4 Color-Coded Rear Overlay

The labels on the rear panel are color coded to group similar functions under common colors.

8.5 Rear Rack Ears with Integral EZ-Rack Pin

The rear rack ears have a built-in EZ-Rack Pin for easier installation.

9 Appendix: TCP-IQ Network Basics

9.1 TCP/IQ Network Basics

TCP/IQ™ is a network based protocol that has the ability to control and monitor IQ components over a common TCP/IP network. For IQ components that have CobraNet capability, TCP/IQ has the ability to control and monitor these IQ components over the same Ethernet network used for CobraNet audio, resulting in a single Category-5 connection for control, monitoring, and digital audio. Figure 9.1 shows a typical TCP/IQ network.

TCP/IQ offers a number of advantages over other non-network communications platforms.

- **The use of "off-the-shelf" networking hardware.** This technology makes use of network connectivity and hardware commonly used in the computer industry, making it both low-cost and readily available.
- **Better Performance.** The capacity for real-time display of meters is greatly enhanced through the use of the wide-bandwidth network.
- **Single connection for both CobraNet audio and IQ communications**. Gone are the days of multiple connections to a component for audio and control. A single CAT-5 connection handles it all.

Some of the features of TCP/IQ include:

- Ability to quickly discover all IQ components connected to the network.
- Synchronization of multiple control points on a network.
- Control and monitor of IQ components on different Local Area Networks (LANs) through the use of an IP router.
- Component firmware upgrades via the network.

Ethernet Networks are established through the use of either a hub or a switch. These devices are centralized in the network and transfer the Ethernet data from point to point. Ethernet data is transferred in data packets that have addresses coded into their structure. Hubs and switches decipher these addresses and route the data packets to the appropriate component. Hubs do this by taking packets from any port and sending them out all other ports. Switches, on the other hand, are more intelligent and examine each packet's address, sending that packet only to the addressed component. This results in a much more efficient data flow. TCP/IQ depends on the use of 100Mb switches and their use is highly encouraged. 100Mb OR 100Base-T switches are required in CobraNet networks.

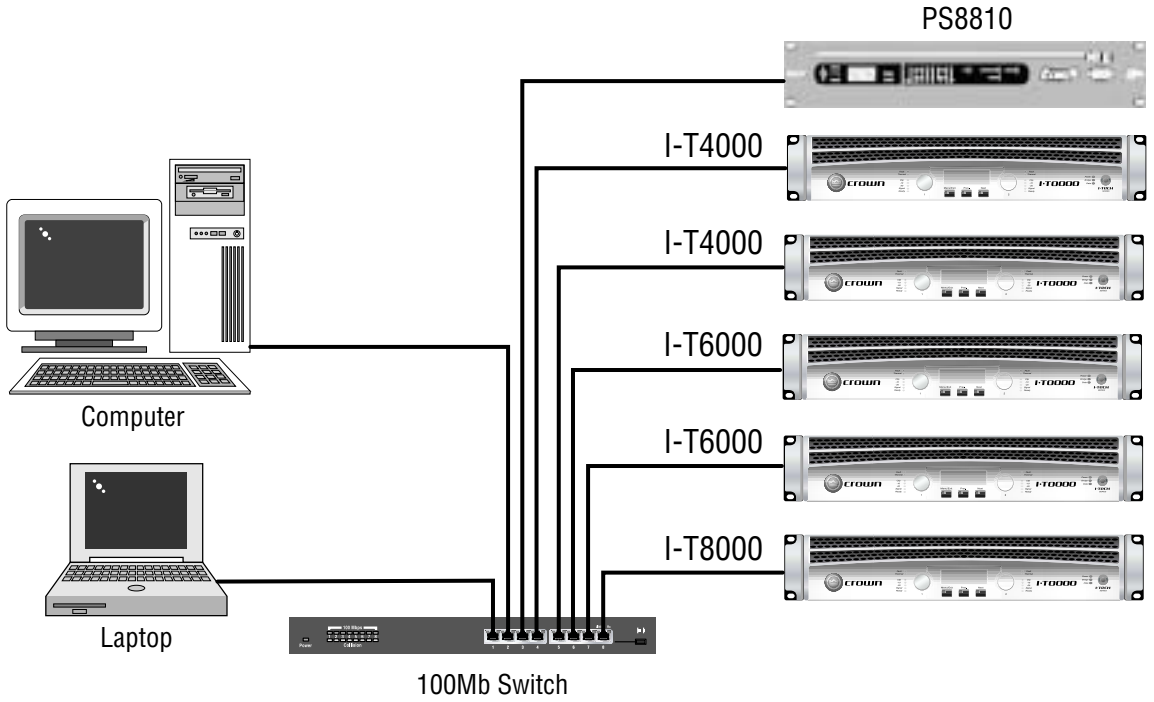


Figure 9.1 A TCP/IQ Network

Communications between networks is allowed, but requires the use of a special piece of equipment called an IP Router. The router acts as a Gateway to allow this communication to exist. Any data traffic that is to go to the other network is routed through the IP Router. The CobraNet data is held behind but IP data goes through.

Each IQ Component has three identifiers that are used in the TCP/IQ system:
- Media Access Control (MAC) Address
- Internet Protocol (IP) Address
- IQ Address

Let's explain each identifier.

Media Access Control (MAC) Address: This is a physical address that specifies a specific physical network component. This address is predefined during manufacture and cannot be modified. No two network components have the same MAC address and each component is uniquely identified by its MAC address. This 48 bit address is located on the outside of every IQ component and is shown in hexadecimal format as 6 two-byte octets such as: **00-0A-40-00-DC-2F**

Internet Protocol (IP) Address: The IP address of a component is assigned during the setup of the network and identifies the IQ component to a larger audience. Because the MAC address is limited to a single physical LAN, communications between LANs is impossible solely through the use of the MAC address. The IP address allows components and controllers on other networks to communicate with each other through the use of an IP Router as shown in Figure 9.2.

This allows the network designer to isolate network traffic from each other. For example, when using wireless devices to control IQ components, the bandwidth limitation of wireless devices will not allow them to reside on the same network with CobraNet. As a result, the use of an IP router and a separate network allows the wireless controllers to access the IQ components through the router using IP addressing. The IP address appears as four numbers (0-255) separated by periods, such as: **126.126.0.1**

IQ Address: TCP/IQ components will be addressed with a unique number from 1 to 65,535 and are assigned within the IQ software. A separate utility is then run which queries the network and establishes what IQ components and their associated MAC addresses are present. An IP Address and IQ Address can then be assigned to each IQ component.

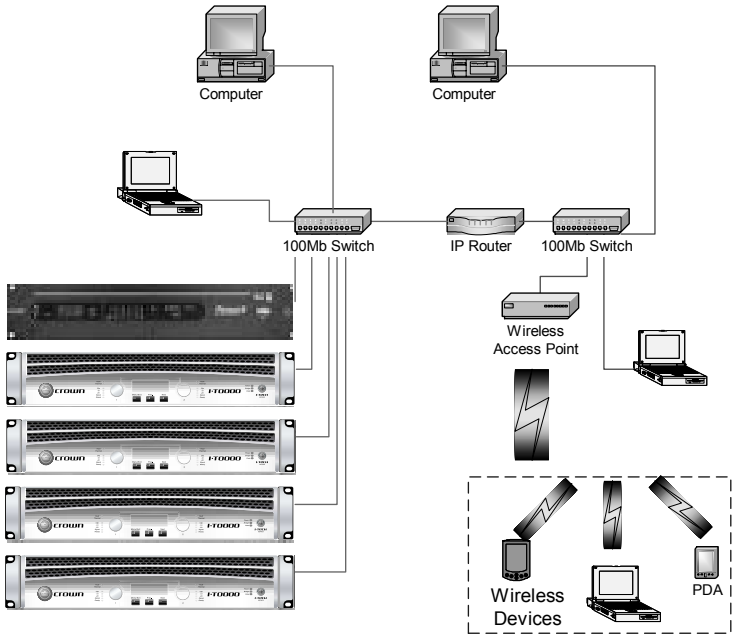


Figure 9.2 Multiple Network Communication Via an IP Router

The MAC address does uniquely identify each TCP/IQ component and can be used to establish the physical location of the unit. The binding of the MAC address to the IQ address through the use of the TCP/IQ Utility assures that each TCP/IQ component is physically in the right position. The use of the IP address establishes the Local Area Network (LAN) and what components reside within that LAN. The Subnet Mask associated with each IQ Component tells what IP addresses can be assigned to a particular LAN. The Subnet Mask is also four numbers (0-255) separated by periods. For example, a subnet mask of 255.255.0.0 and an IP address of 126.126.1.123 says that all IP addresses in that LAN are in the IP address range of 126.126.1.1 to 126.126.1.255.

If a TCP/IQ controller is on a different network than the TCP/IQ components, communications must occur through an IP router. TCP/IQ discovery requires the use of broadcast Ethernet data packets onto the network. These broadcast commands cannot be done through an IP router, therefore a Discovery Proxy is required. The establishment of this proxy is done in TCP/IQ by naming the IP address of a known component on the component network as the Discovery Proxy within IQWin or TCPIQ Util.

9.2 A Closer Look at CobraNet (CobraNet input available in optional CN models, coming soon)

CobraNet is a licensed technology developed by Peak Audio, Inc. consisting of proprietary communications protocol, firmware and hardware. It allows reliable, deterministic transmission of digital audio over a 100Base-T Fast-Ethernet network.

This section provides an overview of CobraNet. Peak Audio has provided a number of technical papers that describe CobraNet in detail. These papers are available at http://www.PeakAudio.com.

9.2.1Fast Ethernet (100Base-T)

Fast Ethernet (100Base-T) uses a hub to interconnect all network nodes to form a star topology (see Figure 9.3). In the star topology all PCs are connected to a centralized hub. Messages are sent from the originating PC to the hub, which then transmits the message either to the whole network or, if a switched hub is used, to the destination PC only. Hubs may be active or switched.

In larger Fast Ethernet networks, additional hubs, concentrators, and other network hardware are used to form a larger network, as shown in Figure 9.4.

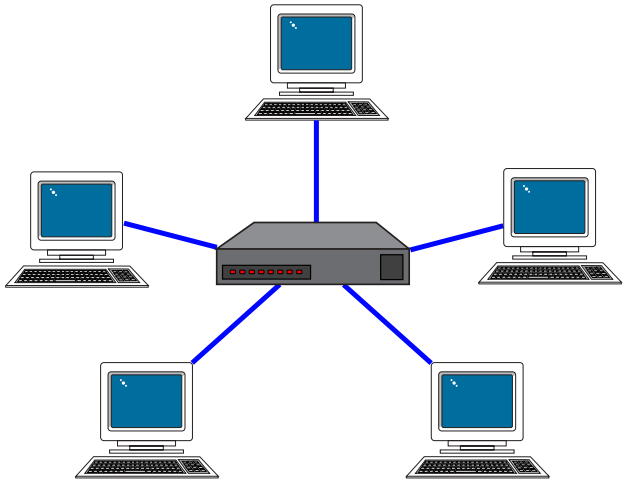


Figure 9.3 Star Network Topology

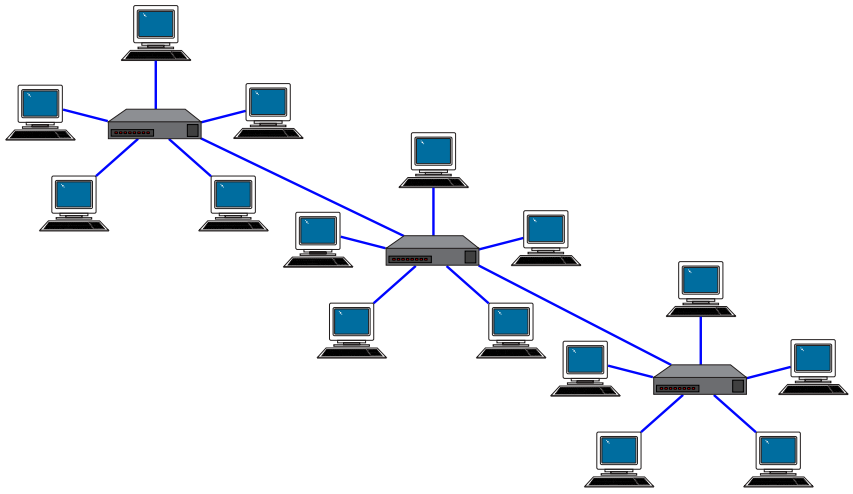


Figure 9.4 Multi-Star Topology

Today, commonly available networking cards are 10/100Base-T capable, which allows them to be used on either 10BaseT or 100Base-T networks.

Fast Ethernet distance limitations apply to CobraNet installations: 100 meters over Cat-5 copper cable, 2 kilometers over multimode fiber. Proprietary Fast Ethernet via single mode fiber solutions can reach even further.

9.2.2 Audio Specs

CobraNet implements fixed sample rates of 48 kHz or 96 kHz, but I-Tech amps work only at 48 kHz. They cannot receive audio from devices operating at 96 kHz. Each channel may be selected to transmit 16-, 20- or 24-bit audio data as desired. The transmitter and receiver buffering required for reliable transmission is fixed at 256 samples yielding a network transmission latency of 5.333 ms (256 samples at 1/48 kHz per sample).

9.2.3 The Conductor

A CobraNet system is coordinated by one of the devices called the Conductor. When two or more CobraNet devices are interconnected properly, one of the devices will be elected the network conductor based on a priority scheme. The Conductor indicator will light on the CobraNet device that is serving as the conductor.

Deterministic transmission on Ethernet is enabled by a protocol that implements a "Conductor" for control of time-division multiplexing and clock recovery. The "Conductor" periodically broadcasts a well-defined "beat" packet onto the network for each transmitter and receiver to recover synchronous timing information. The "beat" also includes information as to which addresses can transmit at certain time slots within the "beat" period.

The Conductor regulates the CobraNet digital audio traffic on the CobraNet network. Each transmitter is given a "permission" to transmit in a given time-slot within the Conductor controlled isochronous cycle-time. The time-slot is determined by the assigned bundle priority. Higher bundle priorities receive lower-numbered positions and are transmitted first. The "Receiver Count" monitor indicates how many devices are receiving the digital audio bundle. The "Active" indicator indicates whether the particular Bundle is being actively transmitted onto the network.

9.2.4 Bundles and Audio Channels

All audio channels are packaged into groups called Bundles (formerly called Network Channels) for transmission over the Ethernet network. Each CobraNet device has the ability to send and receive a fixed number of Bundles. The Bundle number tells the CobraNet conductor which specific CobraNet device is trying to communicate with which other CobraNet device(s) over the network. A given Bundle may have only one transmitter that places it onto the network. Unicast Bundles may have only a single receiver. Multicast Bundles may have multiple receivers.

Bundles from 1 to 255 are designated as "multicast" ("broadcast") Bundles. This means that they are transmitted to multiple receivers. This type is most used on "repeater" networks limited to 64 channels.

Bundles from 256 to 65,279 are "uni-cast". This means that they are transmitted to one and only one receiver. This type is most used on "switched" networks requiring more than 64 channels.

A Bundle can carry up to 8 audio channels. The usual assignment is 8 channels at 20 bits. Using less audio channels is possible but maximum size bundles are suggested for most efficient utilization of network bandwidth. If 24-bit data is desired, then only 7 audio channels can be loaded into a single Bundle.

9.2.5 Repeater Networks

CobraNet can operate on "repeater" networks and more complex "switched" networks. Repeater networks use low-cost Ethernet hubs.[1] On this type of an Ethernet network, all packets are broadcast to all connected nodes. CobraNet multi-cast and uni-cast Bundles can be assigned but because of the simpler repeater-type hubs, even uni-cast transmissions are broadcast to all nodes. Therefore, a maximum of 8 full-loaded Bundles (64 audio channels) are allowed on the entire network. More Bundles may be allowed if they are loaded with less than the full eight audio channels. There is no limit to the number of active receivers on a repeater network. Generally, a repeater based CobraNet network must be dedicated to CobraNet traffic only to guarantee reliable transmission of audio packets.

9.2.6 Switched Networks

A more complex CobraNet network can be built using Ethernet Switches.[2] Ethernet switching technology is more sophisticated than hubs. Switches do not simply broadcast each and every packet to all nodes. Instead, they can interrogate each incoming packet transmission to determine its destination and (very quickly) transmit the data to only that destination port. This allows for more overall network traffic. In effect each port has 100MB of bandwidth and the overall network can be as large as 100MB times the number of ports on the network.

Switched networks allow both multi-cast and uni-cast CobraNet Bundles. Uni-cast transmissions can only be received by a single node and are typically used for point-to-point routing. This technique leverages Ethernet switching technology to significantly conserve overall network bandwidth and in-turn allow many more Bundles and Audio Channels.

Another enhancement available with most switched network environments is "full-duplex" links. A full-duplex link allows simultaneous send and receive over the same Ethernet connection. This allows simultaneous send and receive of up to 64 channels per node for a total of 128 channels. That said, please keep in mind that today's CobraNet node designs are only capable of 64 channels (32 in and 32 out).

The combination of switching and full-duplex technologies in switched CobraNet networks allows up to 128 channels per node and greater than 3000 individual uni-cast channels. There is no limit to the number of active receivers on a switched CobraNet network. Switched networks also allow control traffic such as PCs, to coexist on the same network as CobraNet devices.

[1] See Tested Ethernet Products on the Peak Audio website for a list of recommended Ethernet repeaters.

[2] See Tested Ethernet Products on the Peak Audio website at www.peakaudio.com/CobraNet for a list of recommended Ethernet switches.

10 Service

Crown amplifiers are quality units that rarely require servicing. Before returning your unit for servicing, please contact Crown Technical Support to verify the need for servicing.

This unit has very sophisticated circuitry which should only be serviced by a fully trained technician. This is one reason why each unit bears the following label:

CAUTION: To prevent electric shock, do not remove covers. No user serviceable parts inside. Refer servicing to a qualified technician.

10.1 Worldwide Service

Service may be obtained from an authorized service center. (Contact your local Crown/Amcron representative or our office for a list of authorized service centers.) To obtain service, simply present the bill of sale as proof of purchase along with the defective unit to an authorized service center. They will handle the necessary paperwork and repair.

Remember to transport your unit in the original factory pack.

10.2 US and Canada Service

Service may be obtained in one of two ways: from an authorized service center or from the factory. You may choose either. It is important that you have your copy of the bill of sale as your proof of purchase.

10.2.1 Service at a US or Canada Service Center

This method usually saves the most time and effort. Simply present your bill of sale along with the defective unit to an authorized service center to obtain service. They will handle the necessary paperwork and repair. Remember to transport the unit in the original factory pack. A list of authorized service centers in your area can be obtained from the Crown website at www.crownaudio.com, or by calling Crown Customer Service.

10.2.2 Factory Service

To obtain factory service, fill out the service information page found in the back of this manual and send it along with your proof of purchase and the defective unit to the Crown factory.

For warranty service, we will pay for ground shipping both ways in the United States. Contact Crown Customer Service to obtain prepaid shipping labels prior to sending the unit. Or, if you prefer, you may prepay the cost of shipping, and Crown will reimburse you. Send copies of the shipping receipts to Crown to receive reimbursement.

Your repaired unit will be returned via UPS ground. Please contact us if other arrangements are required.

10.2.3 Factory Service Shipping Instructions:

1. Before sending a Crown product to the factory for service, first call the Crown Service Department for a return authorization (RA) number.
2. Be sure to fill out the service information form that follows and enclose it with your shipment, either inside the box or in a packing slip envelope securely attached to the outside of the shipping carton. Do not send the service information form separately. If you are sending the unit from a Shipping Center, we recommend taping the form to the product. We also recommend recording the serial number and model before shipping for your reference.
3. To ensure the safe transportation of your unit to the factory, ship it in an original factory packing container. If you don't have the original carton, you may obtain a product service foam-in-place shipping pack from the Crown Factory Service Department at the number listed below. For non-warranty service, you may also provide your own shipping pack, however we still recommend using a Crown Supplied Shipping Container. Minimum recommended requirements for materials are as follows: 275 P.S.I. burst test Double-Wall carton that allows for 2-inch solid Styrofoam on all six sides of unit or 3 inches of plastic bubble wrap on all six sides of unit; securely seal the package with an adequate carton sealing tape. Do not use light boxes or "peanuts." Damage caused by poor packing cannot be covered under warranty.
4. Do not ship the unit in any kind of cabinet (wood or metal). Ignoring this warning may result in extensive damage to the unit and the cabinet. Accessories are not needed—do not send the product documentation, cables and other hardware.

If you have any questions, please contact Crown Factory Service.

Crown Factory Service
1718 W. Mishawaka Rd.,
Elkhart, Indiana 46517 U.S.A.

Telephone: 574-294-8200
800-342-6939 (North America,
Puerto Rico, and Virgin Islands only)

Facsimile:
574-294-8301 (Technical Support)
574-294-8124 (Factory Service)

Internet:
http://www.crownaudio.com

11 Warranty

UNITED STATES & CANADA

SUMMARY OF WARRANTY

Crown International, 1718 West Mishawaka Road, Elkhart, Indiana 46517-4095 U.S.A. warrants to you, the ORIGINAL PURCHASER and ANY SUBSEQUENT OWNER of each NEW Crown product, for a period of three (3) years from the date of purchase by the original purchaser (the "warranty period") that the new Crown product is free of defects in materials and workmanship. We further warrant the new Crown product regardless of the reason for failure, except as excluded in this Warranty.

ITEMS EXCLUDED FROM THIS CROWN WARRANTY

This Crown Warranty is in effect only for failure of a new Crown product which occurred within the Warranty Period. It does not cover any product which has been damaged because of any intentional misuse, accident, negligence, or loss which is covered under any of your insurance contracts. This Crown Warranty also does not extend to the new Crown product if the serial number has been defaced, altered, or removed.

WHAT THE WARRANTOR WILL DO

We will remedy any defect, regardless of the reason for failure (except as excluded), by repair, replacement, or refund. We may not elect refund unless you agree, or unless we are unable to provide replacement, and repair is not practical or cannot be timely made. If a refund is elected, then you must make the defective or malfunctioning product available to us free and clear of all liens or other encumbrances. The refund will be equal to the actual purchase price, not including interest, insurance, closing costs, and other finance charges less a reasonable depreciation on the product from the date of original purchase. Warranty work can only be performed at our authorized service centers or at the factory. Warranty work for some products can only be performed at our factory. We will remedy the defect and ship the product from the service center or our factory within a reasonable time after receipt of the defective product at our authorized service center or our factory. All expenses in remedying the defect, including surface shipping costs in the United States, will be borne by us. (You must bear the expense of shipping the product between any foreign country and the port of entry in the United States including the return shipment, and all taxes, duties, and other customs fees for such foreign shipments.)

HOW TO OBTAIN WARRANTY SERVICE

You must notify us of your need for warranty service within the warranty period. All components must be shipped in a factory pack, which, if needed, may be obtained from us free of charge. Corrective action will be taken within a reasonable time of the date of receipt of the defective product by us or our authorized service center. If the repairs made by us or our authorized service center are not satisfactory, notify us or our authorized service center immediately.

DISCLAIMER OF CONSEQUENTIAL AND INCIDENTAL DAMAGES

YOU ARE NOT ENTITLED TO RECOVER FROM US ANY INCIDENTAL DAMAGES RESULTING FROM ANY DEFECT IN THE NEW CROWN PRODUCT. THIS INCLUDES ANY DAMAGE TO ANOTHER PRODUCT OR PRODUCTS RESULTING FROM SUCH A DEFECT. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATIONS OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

WARRANTY ALTERATIONS

No person has the authority to enlarge, amend, or modify this Crown Warranty. This Crown Warranty is not extended by the length of time which you are deprived of the use of the new Crown product. Repairs and replacement parts provided under the terms of this Crown Warranty shall carry only the unexpired portion of this Crown Warranty.

DESIGN CHANGES

We reserve the right to change the design of any product from time to time without notice and with no obligation to make corresponding changes in products previously manufactured.

LEGAL REMEDIES OF PURCHASER

THIS CROWN WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE. No action to enforce this Crown Warranty shall be commenced after expiration of the warranty period.

THIS STATEMENT OF WARRANTY SUPERSEDES ANY OTHERS CONTAINED IN THIS MANUAL FOR CROWN PRODUCTS. 12/01

11 Warranty

WORLDWIDE EXCEPT USA & CANADA

SUMMARY OF WARRANTY

Crown International, 1718 West Mishawaka Road, Elkhart, Indiana 46517-4095 U.S.A. warrants to you, the ORIGINAL PURCHASER and ANY SUBSEQUENT OWNER of each NEW Crown1 product, for a period of three (3) years from the date of purchase by the original purchaser (the "warranty period") that the new Crown product is free of defects in materials and workmanship, and we further warrant the new Crown product regardless of the reason for failure, except as excluded in this Warranty.

1 Note: If your unit bears the name "Amcron," please substitute it for the name "Crown" in this warranty.

ITEMS EXCLUDED FROM THIS CROWN-WARRANTY

This Crown Warranty is in effect only for failure of a new Crown product which occurred within the Warranty Period. It does not cover any product which has been damaged because of any intentional misuse, accident, negligence, or loss which is covered under any of your insurance contracts. This Crown Warranty also does not extend to the new Crown product if the serial number has been defaced, altered, or removed.

WHAT THE WARRANTOR WILL DO

We will remedy any defect, regardless of the reason for failure (except as excluded), by repair, replacement, or refund. We may not elect refund unless you agree, or unless we are unable to provide replacement, and repair is not practical or cannot be timely made. If a refund is elected, then you must make the defective or malfunctioning product available to us free and clear of all liens or other encumbrances. The refund will be equal to the actual purchase price, not including interest, insurance, closing costs, and other finance charges less a reasonable depreciation on the product from the date of original purchase. Warranty work can only be performed at our authorized service centers. We will remedy the defect and ship the product from the service center within a reasonable time after receipt of the defective product at our authorized service center.

HOW TO OBTAIN WARRANTY SERVICE

You must notify your local Crown importer of your need for warranty service within the warranty period. All components must be shipped in the original box. Corrective action will be taken within a reasonable time of the date of receipt of the defective product by our authorized service center. If the repairs made by our authorized service center are not satisfactory, notify our authorized service center immediately.

DISCLAIMER OF CONSEQUENTIAL AND INCIDENTAL DAMAGES

YOU ARE NOT ENTITLED TO RECOVER FROM US ANY INCIDENTAL DAMAGES RESULTING FROM ANY DEFECT IN THE NEW CROWN PRODUCT. THIS INCLUDES ANY DAMAGE TO ANOTHER PRODUCT OR PRODUCTS RESULTING FROM SUCH A DEFECT.

WARRANTY ALTERATIONS

No person has the authority to enlarge, amend, or modify this Crown Warranty. This Crown Warranty is not extended by the length of time which you are deprived of the use of the new Crown product. Repairs and replacement parts provided under the terms of this Crown Warranty shall carry only the unexpired portion of this Crown Warranty.

DESIGN CHANGES

We reserve the right to change the design of any product from time to time without notice and with no obligation to make corresponding changes in products previously manufactured.

LEGAL REMEDIES OF PURCHASER

No action to enforce this Crown Warranty shall be commenced after expiration of the warranty period.

THIS STATEMENT OF WARRANTY SUPERSEDES ANY OTHERS CONTAINED IN THIS MANUAL FOR CROWN PRODUCTS. 7/01

Crown Factory Service Information

Shipping Address: Crown Factory Service, 1718 W. Mishawaka Rd., Elkhart, IN 46517

Phone: 1-800-342-6939 or 1-574-294-8200 Fax: 1-574-294-8124

Owner's Name: _____

Shipping Address: _____

Phone Number: _____ **Fax Number:** _____ **Email:** _____

Model: _____ **Serial Number:** _____

Purchase Date: _____

NATURE OF PROBLEM

(Be sure to describe the conditions that existed when the problem occurred and what attempts were made to correct it.)

_____

_____

_____

_____

_____

_____

_____

_____

*Other equipment in system:*_____

_____

_____

_____

If warranty has expired, payment will be: ☐ *Cash/Check* ☐ *Visa* ☐ *Master Card* ☐ *C.O.D.* ☐ *Purchase Order for Crown Dealer*

*Card Number:*_____ *Exp. Date:*_____

*Signature:*_____

ENCLOSE THIS PORTION WITH THE UNIT. DO NOT MAIL SEPARATELY.

A Harman International Company